

## SECTION 02010

### SUBSURFACE INVESTIGATION

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 through Division 16 Specification Sections, apply to the Work of this Section.

##### 1.02 RELATED WORK

- A. Section 02200: Earthwork.

##### 1.03 TEST BORINGS

- A. The Owner has explored subsurface conditions by making test borings.
- B. A Geotechnical Engineering report, including Test Boring Logs (***and asphalt core samples where applicable***), is included herein for information only, and is not a part of the Contract Documents. The Owner assumes no responsibility for the accuracy of the information. The report was prepared for design purposes only and may or may not be sufficient to prepare an accurate bid.
- C. The test borings are believed to be a reasonable indication of existing soil conditions. The Contractor shall verify conditions affecting the work and make his own interpretation of the test boring information. The Contractor may conduct additional test borings upon receiving permission from the Owner.
- D. The Contractor's use of this information is at his own risk. The availability of this information does not guarantee that the entire site or soil conditions are as indicated by the report.

END OF SECTION

REPORT TO FOLLOW

## **EDITING INSTRUCTIONS**

### **SECTION 02070**

#### **SELECTIVE DEMOLITION**

1. Renewals and Additions: In conjunction with 1.04A, incorporate the information contained in the school ACM Management Plan into the contract documents (include on the demolition drawings and in a general summary of work in 1.04 and/or 1.06 of this specification as applicable).

**SECTION 02070**  
**SELECTIVE DEMOLITION**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and Division 1 Specifications Sections, apply to the Work of this Section, with special attention to the following:
  - 1. Summary of Work: Section 01010
  - 2. Temporary Utilities: Section 01510
  - 3. Construction Aids: Section 01520 (Temporary Enclosures)
  - 4. Barriers: Section 01530

1.02 RELATED WORK

- A. Site Preparation: Section 02100
- B. Earthwork: Section 02200

1.03 REFERENCE STANDARDS

- A. Occupational Safety and Health Standards for the Construction Industry (29 CFR Part 1926) as promulgated by OSHA.
  - 1. Subpart D – Occupational Health and Environmental Controls, 1926.62-Lead.
  - 2. Subpart T – Demolition.
- B. Virginia Erosion and Sediment Control Handbook
- C. Fairfax County Public Facility Manual

1.04 WORK EXCLUDED

- A. Information related to asbestos abatement/removal and materials and finishes containing asbestos is indicated on the Drawings, and in the school's Asbestos Containing Materials (ACM) Management Plan, available on site and included at the end of this section. Removal of asbestos containing materials shall be performed by a licensed asbestos abatement/removal contractor retained by the Owner, except as noted in 1.06 below

- B. It shall be the responsibility of the Contractor to notify the Owner prior to initiating selective demolition in existing building areas where the presence of asbestos has been identified. Selective demolition shall not commence until asbestos-containing material has been removed.
- C. The Contractor shall include a time allowance for notification and abatement/removal operations for identified ACM in his work schedule.
  - 1. A minimum 20-day notification to the EPA and the Virginia State Department of Labor and Industry is required where removal and disturbance of more than 10 LF per 10 SF of ACM is required.

#### 1.05 CONTRACTOR QUALIFICATIONS

- A. The Contractor shall have personnel on site during performance of selective demolition who are trained to identify ACM and other hazardous material, and who are familiar with removal procedures for non asbestos containing hazardous materials (See 1.06 below). The Contractor shall provide evidence of certification for these personnel.
- B. For removal of existing elevator, the contractor shall use subcontractors licensed for such work. The subcontractor shall obtain a permit for the work and have the work inspected after demolition is complete.

#### 1.06 DESCRIPTION OF WORK

- A. General:
  - 1. The contractor shall remove and legally dispose of all equipment and materials indicated on the drawings, including those items that contain regulated hazardous materials. Regulated hazardous materials shall require specialized disposal in accordance with applicable regulations. The Contractor will coordinate the scheduling of the removal of all hazardous materials with the Owner and provide the Owner with documentation that the hazardous waste is disposed at an authorized waste disposal facility.
    - a. Regulated hazardous materials include the following:
      - 1) Fluorescent lamps and PCB containing ballasts.
      - 2) Lead paint, glazed surfaces, putty and sealants in windows/frames.
        - a) Remove primer from existing steel prior to making modifications required by the structural drawings. Where modifications run along the structural steel completely, remove primer from area or work.

Where modifications intersects at 90 degrees+/-, remove primer 1 foot each side of the connection for a minimum of 2 feet total.

- 3) Metal primer on structural steel and steel windows.
  - 4) CFC type refrigerants such as R-12 ("Freon").
  - 5) Wood utility poles treated with creosote.
2. Lead-containing painted and glazed surfaces that contain detectable concentrations of lead, including concentrations less than the definition of LBP, must be handled in accordance with the OSHA Lead in Construction Standard. Contractors performing work that could impact paint films or glazing that have detectable concentrations of lead should be informed of the testing results, and should take appropriate actions to comply with the OSHA Lead in Construction Standard. Appropriate actions would include but not limited to performing air monitoring to measure worker exposure; assuring that the workers are provided with adequate respiratory protection; and assuring that workers are provided with appropriate training.
  3. Workers performing demolition of LCSC (lead-containing surface coatings) must have, at a minimum, two-hour lead awareness training in accordance with OSHA Standard 29 CFR Part 1926.62. If LCSC are required to be stripped or removed from the building component substrate, then additional training would be required based upon the measured lead concentration of the surface coating and the airborne lead concentrations measured or anticipated to be generated during the each work activity.
  4. The disposal of waste generated during any restoration, renovation, or demolition operations, including items coated with lead paint, is regulated by EPA Standard 40 CFR Part 261, Subpart C.
- B. Performance of Work
1. Construction of the proposed work will be performed while school is in use. The Contractor shall give full cooperation to the school administration and staff in scheduling and performing the work.
  2. The Contractor shall provide, install and maintain safety and dust barriers as required by applicable health and safety regulations and as specified in Section 01520.
  3. The Contractor shall schedule his work and deliveries so as not to interfere with the normal operation of the school, including morning arrivals and afternoon departures.

4. The Contractor shall give seventy-two hours advance written notice to Owner when work is to be performed that might endanger and inconvenience occupants.
  5. The Contractor shall provide all erosion and sediment control devices as required by site inspector, owner, owner's agent, architect or engineer.
  6. The Contractor shall keep open, protect and maintain all existing fire exits and fire lanes during the entire course of construction.
- C. Protection
1. Erect barriers, fences, guard rails, enclosures, chutes, and shoring to protect personnel, structures, and utilities remaining intact.
- D. Maintaining Traffic
1. Minimize interference with normal use of roads, streets, driveways, sidewalks, and adjacent facilities.
  2. Do not close or obstruct streets, sidewalks, alleys, or passageways without written permission from authorities having jurisdiction.
  3. If required by governing authorities, provide alternate routes around closed or obstructed traffic ways.

## **PART 2 - PRODUCTS**

NOT APPLICABLE

## **PART 3 - EXECUTION**

### **3.01 INSPECTION**

- A. Verify that areas to be demolished are unoccupied and discontinued in use.
- B. Verify that all utilities within the area to be demolished have been cut off and capped.
- C. Do not commence work until conditions are acceptable to Architect and Owner.

### **3.02 PREPARATION**

- A. Remove items scheduled to be salvaged for Owner, and place in designated storage area. (See 3.05, Salvage).

## 3.03 DEMOLITION

- A. Demolition shall be carried out with care so that portions of building that are to remain will be undamaged. Work on exterior of building shall be done with extreme care to prevent risk or harm to persons or property. Install temporary floors consisting of sisal kraft paper over existing floors that are to remain in areas of work. Do not allow debris to accumulate.
- B. Coordinate demolition with work of other trades. Supervise and assist in removal and replacement of existing materials for installation of new mechanical and electrical items. Remove and replace or re-route mechanical, electrical installation as indicated on the drawings and specified or required for installation of new work or remodeling.
- C. Walls
1. At areas where windows are removed, protect adjacent work which shall remain.
  2. Where openings are cut in walls, such openings shall be cut with care to avoid damage to work that shall remain.
  3. Infill masonry shall be toothed, with the exception of face brick which shall be flush vertically with adjoining existing work.
  4. New work shall be carefully installed with materials that match existing, and shall conform to existing planes unless indicated otherwise.
- D. Finishes
1. Existing ceiling, wall and floor finish or trim that is disturbed or destroyed by these operations shall be replaced to abut adjoining walls, floors, ceiling and new construction with material to match existing.
  2. At locations where existing tile floors are disturbed by new construction, existing tile shall be removed to nearest tile joint that parallels new construction and shall be replaced.
- E. Connecting work and new work in extension of existing work shall correspond in all respects with that to which it connects, or similar existing work, unless otherwise indicated or specified. Existing work shall be cut, drilled, altered or temporarily removed and replaced as necessary for performance of Contract.
- F. No structural member shall be cut or altered without written authorization of Architect.
- G. Work remaining in place that is damaged or defaced by work under this contract shall be restored to the original condition at the time of award of contract.

- H. If removal of existing work exposes discolored, unfinished surfaces or work out of alignment, such surfaces shall be refinished or material replaced as necessary to make contiguous work uniform and harmonious.

### 3.04 DISPOSAL

- A. Remove demolition debris daily.
- B. Do not store or burn materials on site.
- C. Transport demolition debris to off-site legal disposal facilities.
  - 1. Hazardous materials such as fluorescent lamps and PCB-containing ballasts shall be disposed of at special collection centers offering specialized recycling and treatment procedures.

### 3.05 SALVAGE

- A. Owner assumes no responsibility for loss or damage to materials or structures on site, salvage value of which Contractor may have reflected in his bid.
- B. Right of first refusal: All existing items of construction, building materials and furnishings (doors, frames, hardware, windows, chalkboards, tackboards, kitchen, heating ventilation, air conditioning, plumbing and electrical equipment, etc.) located in renovated or altered areas of the project shall be carefully removed without damage and remain the property of the Owner unless indicated for re-use in the new work. Any equipment not desired to be retained by the Owner shall be removed from the site and legally disposed of by the Contractor.

END OF SECTION



**SECTION 02100**  
**SITE PREPARATION**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and Supplementary Conditions and Division 1 through Division 16 Specification Sections, apply to the Work of this Section.

1.02 RELATED WORK

- A. Summary of Work: Section 01010
- B. Barriers: Section 01530.
- C. Earthwork: Section 02200.
- D. Selective Demolition: Section 02070.
- E. Topsoiling, Seeding and Sodding: Section 02930.

1.03 DESCRIPTION OF WORK

- A. Demolition, clearing and grubbing required for this work includes, but is not necessarily limited to the following:
  - 1. Providing erosion and siltation control in accordance with the approved site plan and in conformance with Fairfax County Standards, and the Commonwealth of Virginia Erosion and Sediment Control Handbook.
  - 2. Tree removal - including removal of stumps, roots and other debris protruding through ground surface.
  - 3. Removing shrubs, grass, weeds, and other vegetation.
  - 4. Removing improvements or obstructions that interfere with new construction.
  - 5. Constructing temporary barriers (at drip line of tree) around trees designated to remain, and other tree preservation measures as shown on the site plan or required by the county inspector.
  - 6. Disconnecting and removing existing utility lines on the site except those designated to remain or designated to be abandoned in place.
  - 7. Removal of all debris.

8. Protect existing trees, shrubs, lawns, curbs, gutters and pavement not designated to be removed, and utilities above and below grade.
  9. Contractor shall be responsible for providing sediment and erosion control for ALL disturbed areas prior to and during the course of construction. Such disturbed areas shall include the contractor's staging areas, all disturbed areas as shown on the contract drawings, and all disturbed areas that are not shown on the contract drawings.
- B. Definitions:
1. The term "Demolition, Clearing, and Grubbing", includes the removal of all existing objects (except for those designed to remain) down to the existing ground level, or below grade if required to properly execute the Work, plus such other work as described in this Section.
  2. The terms "Relocate" and "Salvage" include the careful removal of existing materials to prevent damage, and re-installation in the location designated on the plans. Existing materials designated to be relocated or salvaged, and damaged due to improper methods or care shall be replaced in kind at no cost to the Owner.

#### 1.04 JOB CONDITIONS

- A. Existing Utilities: The location of all existing utilities are approximate. These locations have been determined from field survey, public utility records and/or Owner records.
1. The Contractor shall be responsible for contacting "Miss Utility" and all Owner's or controlling agencies of existing utilities within the construction area for verification of locations, prior to beginning of work.
  2. The Contractor shall be responsible for verifying the locations and depths of all existing utilities that may be affected by the work prior to any excavation, demolition or construction.
  3. The Contractor shall be responsible for coordination of utility relocation or removal by others with all phases of construction activities.
- B. Performance of Work:
1. The Contractor shall coordinate a preconstruction meeting consistent with the requirements set forth in 3.01-4 of this section.
  2. The Contractor shall provide, install and maintain safety barriers as required by applicable health and safety regulations and as specified in Section 01520 and Virginia Erosion and Sediment Handbook.

## C. Maintaining Traffic:

1. Minimize interference with normal use of roads, streets, driveways, sidewalks, and adjacent facilities.
2. Do not close or obstruct streets, sidewalks, alleys, or passageways without written permission or an approved traffic control plan from authorities having jurisdiction.
3. If required by governing authorities, provide alternate routes around closed or obstructed traffic ways. The Contractor shall provide a traffic control plan and shall submit it for review and approval by the authorities having jurisdiction prior to any disruption of traffic in public rights-of-way.

## D. Dust Control:

1. Use necessary means to prevent spread of dust during performance of work as specified in the Virginia Erosion and Sediment Control Handbook.
2. Moisten surfaces as required to prevent dust from being a nuisance to the public, adjacent property owners, and concurrent performance of other work on site.

## E. Disposal of Waste:

1. On-site burning shall not be permitted.
2. Remove waste materials and unsuitable or excess topsoil from site and legally dispose.

## F. Protection:

1. Protect existing site features and other objects designated to remain.
2. Provide erosion and sediment control measures as indicated on the approved plans. Phase I erosion and sediment controls shall be installed by the Contractor, and inspected and approved by Fairfax County prior to beginning any site demolition or other land disturbing activities.
3. Protect existing site features designated to be salvaged or removed and returned to Owner.
4. In event of damage, repair or replace at no additional cost to Owner.

## 1.05 SUBMITTALS:

- A. Submit copies of written notifications to public utility companies for disconnection of active utilities.
- B. Submit completed "Responsible Land Disturber" Certification as required by Fairfax County, Office of Site Development Services.

## **PART 2 – PRODUCTS (Not Used)**

## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. Site Inspection:
  - 1. Prior to start of work, inspect entire site and all objects designated to be removed or preserved.
  - 2. Locate existing utility lines and determine requirements for disconnecting and capping.
  - 3. Contact "Miss Utility" at 811 or 1-800-522-7001 to locate existing active utility lines traversing site and determine requirements for protection.
  - 4. Contractor shall notify the Owner's representative, the Architect and the Fairfax County Department of Public Works and Environmental Services prior to and again after commencing activities involving site disturbance, in order to obtain approval of clearing limits and siltation and erosion control procedures.
- B. Clarification:
  - 1. It is not the intent of the drawings to necessarily show all objects existing on site that may be affected by the work of this section.
  - 2. Verify with Architect all objects to be removed or preserved before commencing work.
- C. Bench Marks: The Contractor shall establish and maintain bench marks, monuments, stake-outs and other reference points on the site. Re-establish if disturbed or destroyed, at no cost to owner. This work shall be performed by a professional civil engineer or registered land surveyor, licensed to practice in the Commonwealth of Virginia.

### **3.02 PROTECTION AND RESTORATION:**

- A. Existing Facilities: Protect existing facilities and structures designated to remain, temporarily or permanently, from damage during demolition or construction activities. Repair items damaged during demolition or construction activities to their original condition, or replace with new at no additional cost to the Owner. Do not overload structural elements or pavements to remain. Provide new supports and reinforcement for existing construction weakened by demolition and/or removal work. Repairs, reinforcement or structural replacement shall be approved by the Architect or the Owner's Representative.
- B. Existing Utility Services: Protect existing utility services designated to remain temporarily or permanently, or to be relocated or removed by others. Contractor shall sequence demolition and construction activities to minimize utility service interruptions to existing facilities to remain. Where removal of existing utility services is required for other site construction, provide temporary covering of exposed areas, and temporary service or connections for utilities until permanent utility service replacements are completed.
  - 1. Contractor shall coordinate with affected utility companies to determine extent of relocation work to be done by others.
  - 2. Contractor shall coordinate utility relocation or removal by others with all phases of construction activity.

### 3.03 LIMITS OF CONSTRUCTION

- A. Clear areas as required for access to site excavation and performance of Work.
  - 1. Clearing shall be limited to areas indicated on Drawings. No clearing shall be performed in unmarked areas of Site Plan without written permission of the Architect and Owner.
  - 2. Field flags shall be in place prior to the use of clearing equipment. The Owner's representative and Architect should be notified prior to the start of clearing.
- B. Do not disturb features outside of construction area, or features within construction limits not indicated to be removed. Contractor shall be held responsible for damage to these items and other items not indicated to be removed within or outside of construction limits.

### 3.04 EXISTING SITE IMPROVEMENTS DEMOLITION:

- A. Existing Pavements: Demolish existing pavements, regardless of pavement thickness, or materials, to limits indicated at no increase to contract sum. Neatly

cut existing bituminous concrete pavement to straight, smooth and sharp edges perpendicular to pavement surface.

- B. Existing Walks: Demolish existing walks to limits indicated. Neatly saw cut existing portland cement concrete walks, at nearest control joint to limits indicated, to straight, smooth and sharp edges perpendicular to walk surface.
  - 1. Contractor's Option: Remove existing portland cement concrete walks to nearest expansion joint beyond demolition limits indicated at no increase to contract sum.
- C. Existing Curbing: Demolish existing curbing to limits indicated, unless nearest expansion joint is less than six (6) feet from the indicated limits of removal. In that case, remove existing concrete curbing to the nearest expansion joint beyond the indicated demolition limits at no increase to the Contract Sum. Neatly saw cut existing portland cement concrete curbing, to limits indicated, to smooth, clean and sharp edges perpendicular to top and face of curbing.
  - 1. Contractor's Option: Remove existing concrete curbing to nearest expansion joint beyond demolition limits indicated at no increase to contract sum.
- D. Existing Entrances and Aprons: Demolish existing entrances and aprons indicated.
- E. Miscellaneous: Demolish existing fencing indicated, including posts, footings and related appurtenances. Demolish additional miscellaneous existing site improvements indicated, specified and required to construct project.

### 3.05 EXISTING UNDERGROUND UTILITY DEMOLITION:

- A. Excavate and expose existing underground utilities and related structures designated for, or as required to implement, removals. For excavation operations refer to Section 02200 "Earthwork". Remove existing utility structure castings. Backfill excavations, upon completion of utility demolition operations. For backfill operations refer to Section 02200 "Earthwork".

### 3.06 TREES:

- A. Protect roots and branches of trees designated to remain by placing a barrier around the perimeter of the tree at the drip line. No heavy equipment shall be allowed within the drip line of trees designated to remain.

- B. Remove only trees and shrubs designated to be removed within construction area, unless otherwise specifically indicated or directed.
- C. Completely remove stumps, roots and other debris protruding through ground surface.
- D. Upon permission of the Owner, carefully and cleanly cut branches obstructing new construction.
- E. All trees shall be planted a minimum of 5-feet away from utilities and completely clear of utility easements.

### 3.07 GRUBBING:

- A. Remove all surface rocks, stumps, roots and other vegetation within limits of construction.
- B. Do not leave any roots greater than 3 inches in diameter in the ground without the permission of the Owner.

### 3.08 STRIPPING TOPSOIL

- A. Strip topsoil to whatever depths encountered in such a manner to prevent mixing of topsoil with underlying subsoil or other objectionable material.
- B. Remove heavy growths of grass from areas before stripping.
- C. Where trees are indicated to be left standing, stop topsoil stripping at sufficient distance from trees to prevent damage to main root system.
- D. Stockpile topsoil where directed by Owner and provide erosion protection for all stockpiles.
- E. Construct storage piles to freely drain surface water.
- F. Cover storage piles if required to prevent windblown dust and erosion.
- G. Stabilize storage piles with temporary seeding in accordance with Virginia State Regulations.

### 3.09 REPLACING OF TOPSOIL

- A. Stripped topsoil shall be used for finish grading whenever soil conditions permit - Refer to Section 02930, Topsoil & Sodding.
- B. The Contractor shall furnish and place imported topsoil, if sufficient topsoil is not available at this site at no additional cost to the Owner.

### 3.10 REMOVAL OF DEBRIS

- A. Promptly remove cleared debris from the site in accordance with the approved Waste Management Plan. Burning of debris on site is not permitted.
- B. Obtain permission from applicable regulatory authority for disposal of debris to legal waste disposal site.

3.11 DAMAGED ITEMS

- A. Contractor is fully responsible for replacement of all damaged structures, fences, trees, walks, lawn, utilities, curb and gutter and etc. at its own expense.

END OF SECTION



## **SECTION 02200**

### **EARTHWORK**

#### **PART 1 - GENERAL**

##### **1.01 RELATED DOCUMENTS**

- A. Drawings and General Provisions of Contract, including General Conditions and Supplementary Conditions and Division 1 through Division 16 Specification Sections, apply to the Work of this Section, with special attention to the following:
  - 1. Division One Sections for Testing Laboratory Services

##### **1.02 RELATED WORK**

- A. Section 02010: Subsurface Investigation
- B. Section 02070: Selective Demolition
- C. Section 02100: Site Preparation
- D. Section 02250: Temporary Shoring
- E. Section 02510: Paving and Surfacing
- F. Section 02930: Topsoiling, Seeding and Sodding

##### **1.03 REFERENCE STANDARDS**

- A. ASTM D698 - Moisture - Density Relations of Soils and Soil Aggregate Mixtures
- B. ASTM D1556-82 - Density of Soil in place by the Sand - Cone Method
- C. ASTM D2167-84 - Density and Unit Weight of Soil in Place by the Rubber Balloon Method
- D. ASTM D2487-85 - Soils for Engineering Purposes
- E. Virginia Erosion and Sediment Control Handbook

##### **1.04 REQUIREMENTS OF REGULATORY AGENCIES**

- A. Do not close or obstruct any street, sidewalk, alley, or passageway. Conduct operations to minimize interference with the normal use of roads, driveways, alleys, sidewalks, or other facilities adjacent to the Work.
- B. The successful low bidder, upon notice of award of contract, shall submit a completed "Responsible Land Disturber Certification" through FCPS, to Plan and

Document Control, Office of Land Development Services (LDS), Fairfax County DPWES.

### 1.05 LAYOUT AND GRADES

- A. Contractor shall provide construction surveying by a registered land surveyor or professional civil engineer licensed to practice in the Commonwealth of Virginia for the following:
1. Establishment of field survey control lines and temporary benchmarks.
  2. Providing line and grade offset stakes for curb/gutter and furnishing of cut sheets to the Architect and the Owner.
  3. Providing line and grade survey for water, storm and sanitary sewer pipes and location of structures.
  4. Providing building layout lines and grading stakes.
  5. Provision and maintenance of all surveying stakes, lines, and benchmarks.
- B. "Finished grades" are the required final grade elevations indicated on the civil drawings. Spot elevations govern over proposed contours. Where not otherwise indicated, project site area outside of buildings shall be given uniform slopes between points for which finished grades are indicated or between such points and existing established grades.
- C. "Subgrade" is the required surface of subsoil, borrow fill or compacted fill. This surface is immediately beneath site improvements, specially dimensioned fill, paving, loaming, or other surfacing material.

### 1.06 QUALITY CONTROL

- A. The Owner shall retain the services of an experienced Geotechnical Engineer for the purpose of inspecting the earthwork.
- B. The Contractor shall be responsible for coordinating the required testing and inspections with the Soils Engineering Company retained by the Owner. Any additional costs incurred by the Special Inspections agency due to missed readiness dates or times, or inaccessibility of the site, shall be the responsibility of the Contractor.

### 1.07 EXISTING UTILITIES

- A. Locate and identify active utilities prior to excavation including notifying "Miss Utility" at 811 or 1-800-552-7001. Carefully protect active site utilities from damage and relocate or remove as required by the drawings. Should an active

utility line be exposed during construction, its location and elevation shall be plotted on record drawings. Notify both the Owner and the Utility Owner in writing. Provide all required coordination to prevent delays.

- B. Inactive or abandoned utilities encountered during construction operation and utilities to be removed shall be removed, abandoned, plugged or capped as indicated on the drawings or per Section 02100 of the Specifications or in accordance with the utility owner's standards and regulations, as applicable.

#### 1.08 PROTECTION

##### A. Shoring and Sheeting:

1. Provide shoring, sheeting and bracing at excavations, as required, to ensure complete safety against collapse of earth at side of excavations.
2. Comply with local safety regulations and with the provisions of the Manual of Accident Prevention in Construction of the Associated General Contractors of America, Inc.
3. Remove shoring, as backfilling operations progress, taking necessary precautions to prevent collapse of excavation sides.
4. Shoring or sheeting shall not constitute a condition for which an increase may be made in the Contract Sum.

- B. Make no excavations to the full depth indicated when freezing temperatures may be expected, unless the footings or slabs can be placed immediately after the excavation has been completed. Protect the bottom so excavated from frost if placing of concrete is delayed. Should protection fail, remove frozen materials and replace with concrete or gravel fill, as directed by the Owner's Representative. Stockpiled materials shall be protected at all times from inclement weather and other conditions which can affect the suitability for re-use as fill or structural fill. Moisture control of stockpiled materials shall be the responsibility of the contractor.

#### 1.09 DISPOSAL AND STOCKPILING

- A. Remove all excavated materials not suitable for fill or backfill, including surplus excavated materials, from site and dispose of material legally.
- B. Stockpiling of excavated material suitable for reuse will be permitted where convenient on site and does not interfere with the Work or Owners use of the premises. Owner's Representative shall approve stockpile location prior to placement of material.
- C. Stockpiled materials shall be protected at all times from inclement weather and other conditions which can affect the suitability for re-use as fill or structural fill.

Moisture control of stockpiled materials shall be the responsibility of the contractor.

#### 1.10 TOP SOIL

- A. Contractor shall provide all topsoil required for finishing to grades shown on Drawings. Topsoil shall be provided from site stockpiles, or from off-site sources as necessary.

#### 1.11 DEFINITIONS

- A. Material shall be "unclassified" insofar as removal of material to be excavated is concerned including rock, regardless of the nature or manner in which they are removed. Removal of paving, curbs and paving foundations is classified as "general excavation".
- B. Unsuitable material is defined as topsoil, organic soils, underlying silty and slightly organic subsoil, existing fill and other material judged unsuitable by the Geotechnical Engineer, and located beyond normal or design limits of excavation (i.e. below design subgrade levels).
- C. Rock excavation shall be defined as removal of boulders larger than one (1) cubic yard in volume and removal of ledge rock, concrete or masonry structures which cannot be ripped with a one and one-half (1 ½) cubic yard backhoe or equivalent and requires drilling, blasting, or other special methods for removal.

#### 1.12 SUBMITTALS

- A. Location and source of off-site sources providing additional topsoil, as necessary.

### **PART 2 - PRODUCTS**

#### 2.01 MATERIALS

- A. Excavated materials may not be suitable for compacted structural fill. Soil materials used as fill under floor slabs and footings shall be SM, or better, ASTM D2487. Soil materials used as fill under pavements and as general site fill shall be SC or better, ASTM D2487. Soil material for fill or backfill shall be free of organic matter or debris, waste materials, frozen materials, vegetable matter and rock or stones exceeding three inches in any dimension, shall be non-frost susceptible soils, and shall have a liquid limit of less than 40 and a plasticity index of less than 20.

1. Fill material used within the top 12 inches of fill shall be free of rocks or stones exceeding two inches in any dimension.

2. Provide materials from off-site source if available on-site materials do not meet the above requirements at no increase to contract sum. Imported materials shall be approved by the Geotechnical Engineer.
- B. Gravel Fill: Washed gravel, or crushed stone, coarse aggregate No. 21B, VDOT.
  - C. Porous Fill (Below Building Slabs): ASTM C 33 Coarse Aggregate, size number 467 (1-1/2 inch to No. 4), blast furnace slag shall be prohibited.
    1. Contractor's Option: VDOT size 57 Stone with Geotechnical Engineers approval.
  - D. Topsoil: Fertile, friable, natural surface topsoil capable of producing and sustaining satisfactory turf and landscaping and free of roots, rocks, gravel, sand, spilled concrete, mortar and other debris. Obtain topsoil from project site stockpiles established during clearing operations. Obtain additional topsoil required for landscape development from off-site sources and transport to the project site at no increase to contract sum. Topsoil shall not be delivered in frozen or muddy condition.
  - E. The use of clayey soils for backfill for below grade walls is strictly PROHIBITED. Backfill for below grade walls shall consist of silty sands, coarse grained drainage material, USCS SM or more permeable with an impermeable clay cap, two foot thick with positive slope away from building per foundation drain detail as outlined in Section 02010: Subsurface Investigation.
  - F. Use of recycled materials such as existing brick, CMU block, Portland cement concrete, gravel base course stone and existing fill soils which have been processed at a recycling facility to produce suitable structural fill materials meeting the requirements for suitable structural fill material contained in the structural fill requirements of this specification may be approved by the Owner. Recycled materials that are proposed for use as structural fill materials for use in grading operations shall be sampled, tested and classified by the Geotechnical engineer for suitability.
  - G. Underground Plastic Utility Identification Tapes: All underground utilities shall be properly marked with 6" wide, 4 mil thick continuously printed plastic tape, properly marked and color keyed for the type of utility to be identified. For all storm, sanitary lines and laterals, provide insulated tracer wire in accordance with IPC 703.6.

### **PART 3 - EXECUTION**

#### **3.01 INSPECTION**

- A. Prior to beginning work, become familiar with site, conditions and portions of work specified.

- B. Backfilling prior to approvals:
  - 1. Do not allow or cause work performed or installed to be covered up or enclosed prior to obtaining all necessary inspections, tests, and approvals required.
  - 2. Should work be enclosed or covered up before approval, uncover work and restore disturbed areas at no additional cost to Owner.

### 3.02 EXCAVATING

- A. Excavate to lines, elevations and limits indicated on the drawings, allowing sufficient distance and space to permit erection of forms, shoring and inspections. Excavate as required for placement of utilities and foundations, regardless of type, condition or moisture content of material encountered. If suitable bearings for foundations are not encountered at the depths indicated, immediately notify the Architect and the Owner and do not proceed further until instructions are received.
- B. Excavation is unclassified and no consideration will be given to nature of materials encountered within normal excavation limits. Unclassified excavation comprises and includes satisfactory removal and disposal of all materials encountered. Remove excess earth, including excess topsoil, debris, and material not suitable for fill from site; retain best quality soil for backfilling.
- C. Foundation excavations shall not be exposed for extended periods of time. Footing construction shall be inspected by the Geotechnical Engineer and shall be completed during the same day they are excavated. Footing excavations left open overnight shall be re-inspected by the Geotechnical Engineer prior to foundation construction. The cost of re-inspection and any required remedial measures required due to deterioration of the footing subgrade shall be the sole responsibility of the contractor.
- D. Shore and brace excavations for footings, sumps, areaways, pits, and tanks with members of suitable size and arrangement where necessary to prevent injury to persons, caving or erosion. Remove shoring and bracing as excavations are backfilled.
- E. Contractor shall determine quantities of cut and fill in order to grade site to elevations shown on the civil drawings. Any excess material will be removed from the site in accordance with Paragraph 1.09 (Disposal and Stockpiling) of this section. Any imported material needed to bring site to grades shown on the civil drawings shall be approved by the Geotechnical Engineer prior to bringing such material on site. No additional compensation for importing or removal of soil, in order to bring site into conformance with site plan grades and elevations, shall be considered by the Owner.

- F. During demolition, site preparation, grading, trenching or any other construction related activity if rock is encountered, the contractor shall excavate, remove and dispose of rock within the limits required and in accordance with the contract documents. For pipe and conduit installation, rock excavation shall be carried to a level at least six (6) inches below the bottom of the pipe or conduit for placement of select bedding. Rock excavation and disposal shall be part of the base bid contract and no additional payment considered.
- G. Blasting shall be done only when authorized by the Architect and Owner. All blasting shall be done in accordance with local and state ordinances. Blasting shall not be allowed on Renewal and Addition projects.

### 3.03 EXCESS WATER CONTROL

- A. Do not place, spread, or roll fill material during unfavorable weather conditions.
- B. Do not resume operations until moisture content and fill density are acceptable to the Geotechnical Engineer.
- C. Provide berms and channels to prevent flooding of subgrade. Promptly remove water collecting in depressions.
- D. Where soil has been softened or eroded by flooding or placed during unfavorable weather, remove damaged areas and re-compact as specified for fill and compaction.
- E. Provide and maintain during construction, ample means and devices with which to promptly remove and dispose of water from every source entering excavations.
- F. Dewater by approved means outlined in the current version of Virginia Erosion and Sediment Control Handbook to ensure dry excavations and preservation of final lines and grades at bottoms of excavations.

### 3.04 SITE PREPARATION

- A. Prior to the construction of slabs or pavements or the placement of any fill in slab or pavement areas, all topsoil and other organic materials, frozen, wet, soft or loose soils, and other deleterious materials shall be removed and legally disposed.
- B. Upon completion of excavation activities, exposed subgrade shall be proofrolled utilizing a heavily loaded dump truck or other pneumatic-tired vehicle of similar size and weight, in the presence of the Geotechnical Engineer. Proofrolling shall not be performed during or following wet weather conditions. Any unsuitable materials discovered during proofrolling operations shall be removed and replaced as specified below. Upon completion of proofrolling activities and

approval of the subgrade by the Geotechnical Engineer, exposed subgrade shall be further prepared as follows:

1. Unpaved Areas: Scarify subgrade to six inch depth prior to topsoil placement.
2. Paved Areas: Scarify subgrade to minimum twelve-inch depth and compact to 95 percent maximum dry density. The soils should be aerated or moistened as necessary to maintain the moisture content within 2 percentage points of optimum moisture content. Density test methods: ASTM D 698. Remove unsuitable earth, exhibiting excessive heaving during compaction operations, as specified.

### 3.05 UNSUITABLE EARTH

- A. Immediately notify the Architect/Owner and Geotechnical Engineer in the event unsuitable earth is encountered during earthwork or subsequent construction operations. Stop all work within immediate area of unsuitable earth. Do not remove unsuitable earth until authorization is obtained from the Owner and Geotechnical Engineer and proper measurements are obtained followed by written authorization. Excavate and dispose of all unsuitable earth under the supervision of the Geotechnical Engineer and in accordance with paragraph 1.09. Backfill excavated area as specified.

### 3.06 FILLING AND BACKFILLING

- A. Provide structural fill or backfill from approved on-site material stockpiles, or from off-site if required, to raise all grades to elevations shown on the drawings. Gravel fill (crushed stone) may be substituted in place of fill.
- B. All structural fill or backfill, and fill in sloped areas, shall be placed in loose lifts not exceeding 8 inches. Fill in landscaped areas may be placed in loose lifts not exceeding 12 inches. All fill and backfill shall be uniformly compacted with suitable equipment to at least the specified minimum degree of compaction. The soils should be aerated or moistened as necessary to maintain the moisture content within 2 percentage points of optimum moisture content.
  1. Fill and backfill in structural and pavement areas should be compacted to at least 95 percent of the Standard Proctor maximum dry density (ASTM D-698). The upper 12 inches below slabs on grade shall be compacted to a minimum of 98 percent of the Standard Proctor maximum dry density (ASTM D-698).
  2. Fill and backfill in slope areas shall be compacted to at least 95 percent of the Standard Proctor maximum dry density (ASTM D-698). Subgrade for fills on slopes shall be benched into the existing slopes.



3. Fill and backfill in landscaped areas shall be compacted to at least 90 percent of the Standard Proctor maximum dry density (ASTM D-698).
- C. The Geotechnical Engineer shall perform field density tests on each lift of fill necessary to ensure that adequate compaction is achieved. If any compaction problems are encountered during construction, the Geotechnical Engineer shall be contacted. The Geotechnical Engineer shall recommend modifications to the compaction procedures if required.
  - D. Do not begin backfilling until construction below finish grade has been approved, forms removed, and the excavations cleaned of trash and debris. Bring backfill to required grades. Do not place backfill in wet or frozen areas. Do not operate heavy equipment for spreading and compacting backfill near foundations, curbs, or walls closer than distance equal to height of backfill above top of structural members. Compact area remaining by power-driven hand tampers suitable for material being compacted. Do not place backfills against walls until at least seven days after completion of the walls, and unless walls are adequately braced.

### 3.07 CLEANUP

- A. Thoroughly clean the entire project of trash and other debris. Haul excess materials away and legally dispose of off site. Public streets shall be kept clear of mud and construction debris.

### 3.08 QUALITY CONTROL

- A. The Geotechnical Engineer shall field inspect the installation of the earthwork. Upon completion of the inspection, the Geotechnical Engineer shall certify by a seal of a professional engineer, licensed in the Commonwealth of Virginia, that the Earthwork was installed in accordance with the Contract Documents.
- B. Site Preparation and Proofrolling: The Geotechnical Engineer shall inspect the site after it has been stripped and excavated. The Geotechnical Engineer shall determine if any undercutting or in-place densification is necessary to prepare a subgrade for slab support. The Geotechnical Engineer shall witness the proofrolling with a fully loaded dump truck (minimum 20 tons) provided by the Contractor prior to the placement of engineered fill. Areas of proposed excavation shall be proofrolled after rough finished grade has been established. Proofrolling shall not be performed within 10 feet of an existing building or structure.
- C. Fill Placement and Compaction: The Geotechnical Engineer shall witness any required filling operations and shall take sufficient in-place density tests to verify that the specified degree of fill compaction is achieved. He shall observe and approve borrowed materials used and shall determine if the existing moisture contents are suitable.

- D. Footing Excavation Inspections: The Geotechnical Engineer shall inspect the excavations for the building foundations. He shall verify that the design bearing pressures are available and that no loose or soft pockets exist beneath the bearing surfaces of the footing excavations. Based on the inspection, the Owner's Representative shall either approve the bearing surface or shall require that loose or soft soils be undercut to expose satisfactory bearing materials.
- E. The Geotechnical Engineer shall provide the Architect and Owner with written verification of all testing regarding fill selection, fill placement, and soil bearing capacity at all footings.
- F. Infiltration Facilities: The Geotechnical Engineer shall provide the Architect and Owner with written verification that the material used to construct the BMP facilities meets the requirements of contract drawings and specifications.

END OF SECTION

**SECTION 02250**  
**TEMPORARY SHORING**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions and Division One through Division Five Specification Sections, apply to work of this Section.

1.02 REFERENCE STANDARDS

- A. Latest Edition, "Special Inspections: Implementation in Fairfax County," as administered by Fairfax County Department of Public Works and Environmental Services (DPWES), Office of Code Services, with special attention to Chapters 3 and 12 (Earth Retention Systems).
- B. Pertinent requirements of the "Occupational and Health Standards for the Construction Industry," as promulgated by OSHA.

1.03 WORK DESCRIPTION

- A. Design and construct temporary shoring at excavations to prevent collapse of adjacent materials, and to protect workmen, the general public, structural and site components associated with the Work, and adjacent properties and structure.
- B. The Contractor shall be solely responsible for materials, means and methods for construction of temporary shoring.
- C. The Contractor shall secure all required approvals, including Fairfax County DPWES, and adjacent property owners if required.

1.04 SUBMITTALS

- A. Comply with provisions of Fairfax County Special Inspections Manual for preparation, review, and approval of construction documents for temporary shoring.
  - 1. Construction documents shall be prepared, signed, and sealed by a Registered Design Professional, licensed by the Commonwealth of Virginia, and experienced in the design of temporary shoring.
  - 2. Construction documents shall be reviewed and approved by Fairfax County DPWES prior to beginning work requiring temporary shoring.

3. Submit three (3) copies of approved construction documents to architect for record and distribution to Owner.

#### 1.05 QUALITY ASSURANCE

- A. Use adequate numbers of workmen, who are trained and experienced in the installation of temporary shoring, and who are familiar with the requirements and methods required by this Section, for proper, safe performance of shoring.
- B. Coordinate shoring design and construction with the following:
  1. The Geotechnical Report
  2. Structural Systems included in the Work
  3. Site Structures included in the Work
  4. Existing adjacent structures affected by work requiring temporary shoring

### **PART 2 - PRODUCTS**

#### 2.01 MATERIALS

- A. Provide all materials necessary to construct the temporary shoring, in accordance with the approved construction documents.

### **PART 3 - EXECUTION**

#### 3.01 CONDITIONS

- A. Examine the areas and conditions under which the work of this Section shall be performed. Correct conditions detrimental to proper installation and safe performance of the temporary shoring. Do not proceed until unsatisfactory conditions are corrected.

#### 3.02 INSTALLATION

- A. Install the temporary shoring in strict conformance with the approved construction documents.

#### 3.03 CLEANUP

- A. After work requiring temporary shoring is completed, remove all materials and components associated with the shoring, and remove from site. Dispose of excess materials and debris in a legal manner.

END OF SECTION

**SECTION 02281**  
**TERMITE CONTROL**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and Supplementary Conditions and Division 1 through Division 16 Specification Sections, apply to the Work of this Section.

1.02 RELATED WORK

- A. Earthwork: Section 02200
- B. Cast in Place Concrete: Section 03300
- C. Unit Masonry: Section 04200

1.03 QUALITY ASSURANCE

- A. Applicator shall be registered or licensed where required by state, county, or city jurisdictions.

1.04 WARRANTY

- A. On final acceptance, furnish Owner written guarantee stating application was made in accordance with this specification.
- B. Guarantee effectiveness of treatment for not less than five years.
- C. Guarantee to correct damage caused by termite infestation up to \$50,000.00 in value.

1.05 REFERENCE STANDARD

- A. United States Department of Agriculture Federal Insecticide, Fungicide and Rodenticide Act.
- B. The formulation of all soil poisons, insecticides, fungicides, etc. shall be registered under the Act and shall be registered with the appropriate agency of the Commonwealth of Virginia.

1.06 SUBMITTALS

- A. Comply with requirements of Section 01340

- B. Submit manufacturer's written mixing and application instructions.
- C. Submit evidence of compliance with Federal and State Regulations.
- D. Submit proof applicator is registered or licensed where required by state, county, or city jurisdictions.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS**

- A. General: Use only current EPA approved and registered termiticide according to EPA guidelines and label directions. Products that are banned, recalled or are being phased out are not acceptable. Dursban is prohibited. Use an emulsible, concentrated termiticide that dilutes with water, specially formulated to prevent termite infestation. Fuel oil will not be permitted as a diluent. Use only soil treatment solutions that are not harmful to plants.
- B. Provide a solution consisting one of the following chemical elements:
  - 1. Fipronil:
    - a. Termidor, BASF
  - 2. Premise, Bayer.
  - 3. Permethrin:
    - a. Dagnet.
  - 4. Cypermethrine:
    - a. Prevail FT, FMC Corp.
    - b. Demon, ICI Americas, Inc.
- C. Mixes: Dilute with water to concentration level recommended by the manufacturer. Follow manufacturer's written mixing instructions.

## **PART 3 - EXECUTION**

### **3.01 INSPECTION**

- A. Verify that soil is in friable condition with moisture content low enough to permit absorption of toxicant solution. Remove foreign matter that could decrease effectiveness of treatment.

- B. Do not begin work until earthwork for slab placement has been completed.

### 3.02 APPLICATION

- A. Apply soil treatment to areas beneath concrete floor slabs on grade or fill, and along interior sides of foundation walls and grade beams.
- B. Where exterior is abutted by concrete slabs, asphalt paving or other permanent surfacing, treat exterior sides of foundation walls and grade beams as specified for interior sides of such walls.

### 3.03 RATE OF APPLICATION

- A. Surface Preparation: Remove foreign matter which could decrease effectiveness of treatment on areas to be treated. Loosen, rake and level soil to be treated, except previously compacted areas under slabs and foundations. Toxicants may be applied before placement of compacted fill under slabs, if recommended by toxicant manufacturer.
- B. Application Rates: Apply soil treatment solution as follows:
- C. Under slab-on-grade structures, treat soil before concrete slabs are placed, using the following rates of application:
  - 1. Apply 4 gallons of chemical solution per 10 linear feet of soil in critical areas under slab, including entire inside perimeter inside of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footer.
  - 2. Apply one gallon of chemical solution per 10 square feet as an overall treatment under slab and attached slab areas where fill is soil or unwashed gravel. Apply 1-1/2 gallons of chemical solution to areas where fill is washed gravel or other coarse absorbent material.
  - 3. Apply 4 gallons of chemical solution per 10 linear feet of trench, for each foot of depth from grade to footing, along outside edge of building. Dig a trench 6" to 8" along outside of foundation to a depth of not less than 12". Punch holes to top of footing at not more than 12" on center and apply chemical solution. Mix chemical solution with the soil as it is being replaced in trench.
- D. Under crawl space and basement structures, treat soil along exterior and interior walls of foundations with shallow footings as specified above for exterior of slab-on-grade structures.

- E. Treat soil under or around crawl space structures as follows:
  - 1. Apply 4 gallons of chemical solution per 10 linear feet of trench along inside of foundation walls, along both sides of interior partitions, and around piers and plumbing. Do not apply overall treatment in crawl spaces.
  - 2. Apply 4 gallons of chemical solution per 10 linear feet of trench, for each foot of depth from grade to footing, along outside of foundation walls, including part beneath entrance platform porches, etc.
  - 3. Apply 4 gallons of chemical solution per 10 linear feet along the inside and outside of foundation walls of porches.
  - 4. Apply one gallon per 10 square foot of soil surface as an overall treatment, only where attached concrete platform and porches are on fill or ground.
- F. At hollow masonry foundations or grade beams, treat voids at rate of 2 gallon per 10 linear feet, poured directly into the hollow spaces.
- G. At expansion joints, control joints, and areas where slabs will be penetrated, apply at rate of 4 gallons per 10 linear feet of penetration.
- H. Post signs in areas of application to warn workers that soil termiticide treatment has been applied. Remove signs when areas are covered by other construction.
- I. Reapply soil treatment solution to areas disturbed by subsequent excavation, landscape grading, or other construction activities following application.

END OF SECTION



## SECTION 02364

### SHORT AGGREGATE PIER FOUNDATION SYSTEMS

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division-1 Specification sections, apply to work of this section.
- B. Fairfax County Special Inspections (SIP) "Special Inspections: Implementation in Fairfax County - Current Edition." (SIFC – Current Edition).
- C. Earthwork, Section 02200.

##### 1.02 SUMMARY OF WORK

- A. Provide all labor, specialty geotechnical design, materials, equipment, apparatus, tools, transportation, protection and services necessary for, and reasonably incidental to the design and installation of a complete short aggregate pier foundation system. The aggregate piers shall be constructed by compacting aggregate in an excavation hole using special high-energy impact densification equipment. The aggregate piers shall be in a columnar-type configuration and shall be used to produce an intermediate foundation system for the support of the foundation loads as indicated on the drawings and as specified herein.
  - 1. Provide detailed geotechnical calculations and shop drawings prepared by a professional engineer (hereby referred to as the Specialty Engineer) registered in the Commonwealth of Virginia, to design the short aggregate pier foundation system. Support the loads indicated on the drawings to within the settlement limits indicated in this specification. Verify the settlement limits are satisfied by load testing a pier.
  - 2. Special attention is directed to the submittal requirements for final certification of the short aggregate piers foundation system by the Specialty Engineer.
  - 3. Comply with applicable submittal and approval requirements of the Fairfax County Special Inspections Manual (SIFC-Current Edition) .
- B. Special attention is directed to the allowable installation times for the aggregate piers. Installation of the piers shall be limited to the following time:
  - 1. After normal school hours of operation and as regulated by the Construction Phasing Plan.
  - 2. As limited by Fairfax County Ordinances.

## 1.03 WORK EXCLUDED

- A. Excavation and surface compaction for footings supported by short aggregate piers is not part of the work of this Section but is subject to the restrictions listed in 3.02 of the Section.

## 1.04 DEFINITIONS

- A. Short Aggregate Pier Foundation System: A columnar configuration of aggregate that is produced by compacting aggregate in an excavated cavity using special high energy impact compaction equipment to form a settlement control and foundation support system for column and wall footings.

## 1.05 REFERENCES

- A. Design Standards:
  - 1. "Control of Settlement and Uplift of Structures Using Short Aggregate Piers," by Evert C. Lawton, Nathaniel S. Fox, and Richard L. Handy
  - 2. Settlement of Structures Supported on Marginal or Inadequate Soils Stiffened with Short Aggregate Piers," by Evert C. Lawton and Nathaniel S. Fox
  - 3. Schmertman method for calculating foundation settlement.
- B. Modulus Load Testing:
  - 1. ASTM D1143 – Pile Load Test Procedures
  - 2. ASTM D1194 – Spread Footing Load Test
  - 3. ASTM D3687 – Uplift Load Test
- C. Materials and Inspection:
  - 1. ASTM D1241 – Aggregate Quality
  - 2. ASTM STP 399 – Dynamic Penetrometer Testing
  - 3. ASTM D422 – Gradation of Soils

## 1.06 SUBMITTALS

- A. The Aggregate Pier Installer shall submit detailed geotechnical design calculations, construction drawings, and shop drawings. All plans and calculations shall be signed and sealed by a Professional Engineer registered in the Commonwealth of Virginia. The calculations shall include a detailed

explanation of the design properties for settlement calculation and the load testing procedure.

- B. The Aggregate Pier Installer shall submit proof of compliance with 1.07A, below.
- C. The Aggregate Pier Installer shall submit a notarized manufacturer's certification, indicating that the aggregate and other materials proposed for use shall conform to the requirements of this specification.
- D. Insurance: Certificate verifying the Specialty Engineer's professional liability insurance coverage shall be submitted to the Architect, Structural Engineer, and Owner within 10 days of General Contractor's Notice to Proceed.
- E. Observation Reports: Written field reports presenting the Specialty Engineer's field observations shall be submitted to the Architect, Structural Engineer and Owner's Field Representative within 7 days of each field visit.
- F. Final Certification: Upon completion of the construction, the Specialty Engineer shall submit to the Architect, Structural Engineer, and Owner a written certification that the Short Aggregate Pier Foundation System has been constructed in conformance with the specified performance requirements and the construction documents,
- G. Daily Aggregate Pier Progress Reports – The Testing Agency retained by the Owner shall submit progress reports to the General Contractor, Architect, Structural Engineer, and the Owner in accordance with requirements of Section 01410, Testing Laboratory Services. The reports shall indicate the pier location, length, average lift thickness, and final elevations of the base and top of pier. The report shall also indicate the type and size of the densification equipment used. The Aggregate Pier Installer shall immediately report any unusual conditions encountered during installation to the General Contractor, the aggregate pier designer, and the Testing Agency.

#### 1.07 QUALITY ASSURANCE

- A. Aggregate Pier Installer Qualifications: Installers of aggregate pier foundation systems shall have successfully completed not less than three (3) projects with similar soil conditions, depths and type of work contained in this project.
  - 1. Pre-qualified Aggregate pier Installer:
    - a. GeoStructures, Inc. Leesburg, VA (703) 771-9844 Attn: Mike Cowell
    - b. Hayward Baker, Inc., Odenton, MD (410) 551-1980 Attn: Joe Cavey
    - c. TerraSystems, Inc., Lovettsville, VA (540) 882-4130 Attn: John Jones

B. Specialty Engineer Qualifications: The Contractor shall engage the services of a Professional Engineer who shall be responsible for the design, preparation of short aggregate pier foundation system drawings, quality control, periodic field observation, and final certification of the complete short aggregate pier foundation system. The Specialty Engineer shall have the following minimum qualifications:

- 1. Installer shall have a full time Quality Control Representative on the project site.
- 2. Registered in the Commonwealth of Virginia.
- 3. Specialization in geotechnical design of Short Aggregate Pier Foundation Systems with a minimum of 3 years experience on projects of a similar size and scope.
- 4. Professional liability insurance coverage in the aggregate amount of \$1,000,000.00 to protect the engineer from claims, which may arise in the performance of the engineering services.

C. Survey Work:

- 1. General Contractor shall perform surveys, and layouts for pier work. Conduct layout work for each pier to lines and levels required before installation.
- 2. General Contractor shall furnish building base line, grade information, and building corners.
- 3. Analyze the site conditions and subsurface investigation data prepared by the geotechnical consultant, and make supplemental investigations as deemed necessary by the Specialty Engineer for the proper design of the short aggregate pier foundation system.

4. Performance Requirements:

a. Aggregate piers shall be designed in accordance with generally accepted engineering practice and the method described in "Control of Settlement and Uplift of Structures Using Short Aggregate Piers." The design shall meet the following criteria:

Allowable Bearing Pressure for  
Aggregate Pier Improved Soil----- 6000 psf

Minimum Aggregate Pier Area  
Coverage (Spread Footings) ----- 30%

Estimated Total Long Term

Settlement for Footings -----  $\leq 1''$

Estimated Long Term Differential  
Settlement for Adjacent Footings -----  $\leq 1/2''$

- b. The size and spacing of the aggregate piers as described on the foundation drawings are conceptual and based on preliminary geotechnical information derived during the design process. The Aggregate Pier Installer shall modify the proposed pier locations as necessary to deliver a complete aggregate pier foundation system that shall support the structure, while controlling settlement in accordance with these specifications. The installer may add piers as required to deliver a complete foundation system without additional cost to the Owner.
- c. The design shall be verified by a single pier load test. Test pier location to be specified by the aggregate pier specialty engineer and shall be same diameter and length as the production piers.

#### 1.08 JOB CONDITIONS

- A. Site Examination: Contractor shall examine the site to ascertain the state thereof and to understand the complexities of the work. Compare on-site observations with the drawings: The condition of the premises, the actual elevations, existing obstructions, areas of work, and other conditions that would affect the completion of the work.
- B. A Geotechnical Investigation and Report has been prepared for the site and is available for use by the Bidder (see Section 02010, Subsurface investigation). The report is not a warranty of the subsurface conditions, and is to be used by the Bidder at his risk. Assume responsibility for the deductions made, or the conclusions drawn from such information.

### PART 2 - PRODUCTS

#### 2.01 AGGREGATE PIER MATERIALS

- A. Aggregate above Water Table: Type I Gradation B in accordance with ASTM D1241-68, or other graded aggregate / graded recycled concrete selected by the Aggregate Pier Installer and successfully used in the load test.
- B. Aggregate below Water Table: Type I Gradation B, except particles passing the No. 40 sieve shall be eliminated. Alternatively, No. 57 stone, or other graded stone / graded recycled concrete selected by the Aggregate Pier installer and successfully used in the load test may be used

**2.02 DENSIFICATION EQUIPMENT**

- A. Provide densification equipment of type generally used in Aggregate Pier installation and approved by the pier specialty engineer.

**PART 3 – EXECUTION****3.01 EXAMINATION**

- A. Installer shall examine areas and conditions under which aggregate piers are to be installed and shall notify General Contractor, Architect, Structural Engineer, and Owner in writing of conditions detrimental to proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

**3.02 INSTALLING AGGREGATE PIERS**

- A. In response to actual site conditions, the Specialty Engineer may direct that the quantity of piers may be increased or decreased from the number of piers shown on the submittals.
- B. Aggregate used for piers constructed above the water table shall be compacted to a densification and strength that provides resistance to the dynamic penetration test ASTM STP 399 of a minimum average of 15 blows per 1.75 inch vertical movement.
- C. Perform dynamic penetration tests on each pier until the pattern of performed tests exceeds 15 blows. Once the pattern of test establishes the 15 blows per pier, confine further tests to questionable or differing conditions.
- D. The Aggregate Piers Installer's full time Quality Control Representative shall verify and report all installation procedures.
- E. Rejected Aggregate Piers: Piers improperly located or installed beyond the maximum allowable tolerances shall be abandoned and replaced with new piers, unless the Engineer approves other remedial measures proposed by the installer. All material and labor required to replace rejected aggregate piers shall be provided at no additional cost to the Owner.
- F. Tolerances: The center of each pier shall be within six (6) inches of the plan locations indicated. The final measurement for the top of aggregate piers shall be the lowest point on the aggregate in the last compacted lift.
- G. Footing Bottom
  - 1. All excavations for footing bottoms supported by aggregate pier foundations shall be prepared in the following manner: Over excavation

below the bottom of footing shall be limited to 3 inches. This includes limiting the teeth from excavators from over excavation beyond 3 inches below the footing elevation.

- H. Compaction of surface soil and top of aggregate piers shall be prepared using a standard, hand-operated impact compactor. Compaction shall be performed over the entire footing bottom to compact any loose surface soil and loose surface pier aggregate.

### 3.03 FIELD QUALITY CONTROL

- A. The Owner will engage the services of an approved independent, Testing Agency to perform field inspection of pier installation, and to monitor the load test. The testing agency will issue copies of all reports as specified herein.
- B. The Contractor shall be responsible for scheduling with the Testing Agency, and shall provide free access to work and cooperate with the Testing Agency.
- C. Pier Installation: The Testing Agency and the quality control personnel for the Aggregate Piers Installer shall be present during pier installation and the load test. The Aggregate Pier Installer shall provide all dial indicators and other measuring devices. The Testing Agency inspector shall make detailed records of the installation of each pile and the results of load tests
- D. Aggregate Pier Load Testing: Provide 1 single test pier. Additional tests shall be performed, if deemed necessary by the Aggregate Pier Designer. Use test piers of same diameter as required for Project and install with same equipment as used in installation of production piers. Install test pier as indicated on drawings for production piers. Load single test piers to twice the required design load as indicated on the drawings. The Testing Agency shall monitor the installation of load test aggregate piers to document procedures and criteria used for constructing the load test pier.
- E. Bottom Stabilization Verification Test: After completion of the bottom pier bulb, or at anytime during the process of constructing the pier, the energy source may be turned off, and a bottom stabilization verification test may be performed. These tests shall be performed when a new soil formation is encountered, and at the beginning of a project to provide quantitative information on pier stabilization. A reference bar is placed over the cavity, and a mark is made on the tamper shaft that has been placed on top of the compacted aggregate. The energy to the tamper is restarted. If the measured vertical movement exceeds 150% of the value achieved during the load test, added energy is applied to redensify the bulb. The procedure for measuring is then repeated. If there is still movement greater than 150% of that achieved during the load test and greater than ½ inch, a lift of loose aggregate may be placed on top of the compacted aggregate, and the verification test may be performed on this next lift after it is tested. Movement must be limited to below 150% of the values achieved for the load test before

completion of 2/3 of the pier depth unless unusually powerful modified hydraulic hammers are being used with tamper heads smaller than 26 inches in diameter.

- F. The Specialty Engineer responsible for the design of the short aggregate pier foundation system shall provide final certification in writing regarding their findings.

END OF SECTION



**SECTION 02510**  
**PAVING AND SURFACING**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section, with special attention to the following:
  - 1. Testing Laboratory Services: Section 01410
  - 2. Project Record Information: Section 01720

1.02 RELATED WORK

- A. Subsurface Investigation: Section 02010
- B. Earthwork: Section 02200 (sub-grade preparation)
- C. Cast in Place Concrete: Section 03300

1.03 REFERENCE STANDARDS

- A. Virginia Department of Transportation Standards and Specifications
- B. American Disabilities Act Accessibility Guidelines (ADAAG)

1.04 QUALITY ASSURANCE

- A. Qualifications of Asphalt Concrete Producer: Use only materials which are furnished by a bulk asphalt concrete producer regularly engaged in production of hot-mix, hot-laid asphalt concrete.
- B. Qualification of Testing Agency: The Owner will use a recognized commercial testing laboratory with not less than five years experience in conducting tests and evaluations of asphalt concrete materials and design.
- C. The Owner will provide asphalt concrete testing and inspection service.
- D. The Owner will provide field testing facilities for quality control testing during paving operations.
- E. Qualifications of workmen:
  - 1. Provide at least one person who shall be thoroughly trained and experienced in the skills required, who shall be completely familiar with

the design and application of work described for this Section, and who shall be present at all times during the progress of the work of this Section and shall direct all work.

2. For actual finishing of asphaltic concrete surfaces and operation of the required equipment, use only personnel who are thoroughly trained and experienced.

#### 1.05 REQUIREMENTS OF REGULATORY AGENCIES

- A. Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with the referenced portions of Virginia Department of Transportation "Standards and Specifications" and the Virginia Department of Transportation "Road and Bridge Specifications".

#### 1.06 SUBMITTALS

- A. Submit test reports and certificates for asphalt concrete materials and mixes.
- B. Certify that materials comply with specification requirements signed by asphalt concrete producer and Contractor.

#### 1.07 PAVING QUALITY REQUIREMENTS

- A. General: In addition to other specified conditions, comply with the following minimum requirements.
- B. The Owner's Testing Service will:
  1. Test in-place asphalt concrete courses for compliance with requirements for thickness and surface smoothness.
  2. Take not less than 4-inch diameter pavement specimens for each completed course, from locations as directed by Architect.
- C. The Contractor shall repair holes from test specimens as specified for patching defective work.
- D. Thickness: In-place compacted thicknesses will not be acceptable if exceeding following allowable variation from thicknesses shown on Drawings.
  1. Surface Course: 1/2 inch, plus or minus.
- E. Surface Smoothness
  1. The Contractor will test finished surface of each asphalt concrete course for smoothness, using a 10 foot straightedge applied parallel to and at right angles to centerline of paved areas

2. Check surface areas at intervals directed by Architect.
3. Surfaces will not be acceptable if exceeding the following:
  - a. Surface Course: 1/4 inch in 10 feet
4. Provide final surfaces of uniform texture, conforming to required grades and cross sections.

#### 1.08 WEATHER LIMITATIONS

- A. Do not apply asphalt concrete when the surface is wet or contains an excess of moisture which would prevent uniform distribution and the required penetration.
- B. Construct asphalt concrete surface course only when atmospheric temperature is above 40 degrees F, when the underlying base is dry and when weather is not rainy.
- C. Base course may be placed when air temperature is above 30 degrees F and rising, and when acceptable to the Architect and the Owner.
- D. Grade Control: Establish and maintain the required lines and grades, including crown and cross-slope, for each course during construction operations.
- E. Do not place Portland cement concrete when ambient air temperature is below 40 degrees Fahrenheit or air temperature has been below 35 degrees Fahrenheit for 12 or more consecutive hours or between 15 November and 1 March, without written authorization from the Architect with owner.

#### 1.09 TRAFFIC CONTROL

- A. Sequence and schedule paving work in order to maintain vehicular and pedestrian traffic during paving operations, and as required for other construction activities. If working in the state right-of-way, the contractor shall obtain all necessary permits from the Virginia Department of Transportation (VDOT) and prepare traffic control plans for VDOT approval.

#### 1.10 PRODUCT HANDLING AND PROTECTION

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacement necessary to the approval of the Architect and at no additional cost to the Owner.
- C. Protect asphaltic concrete from traffic for a minimum of 48 hours.

**PART 2 - PRODUCTS**

## 2.01 MATERIALS

- A. Sub-base Course: VDOT Section 208, Grade 21A
- B. Asphalt Base Course: Superpave: VDOT Special Provision Section 211G, Type BM-25
- C. Surface Course: Superpave: VDOT Special Provision Section 211G, Type SM-9.5A
- D. Prime Coat: VDOT Section 210 and 311 cut-back asphalt, AASHTO M82, Grade MC-30
- E. Tack Coat: VDOT Section 210 and 310 emulsified asphalt, CSS-1H (cationic emulsion)
- F. Overlay Binder Coat: asphalt cement, AASHTO M20, type AC-20
- G. Overlay protective membrane:
  - 1. "Petromat", Phillips Fiber Corp.
  - 2. "Amo Pave", Amoco Fabrics Company.
  - 3. Pre-bid approved manufacturer.
- H. Joint Sealant: AASHTO M81, Grade CSS-1H.
- I. Grade Sealer: VDOT Section 213.
- J. Traffic Marking Paint: VDOT Traffic Paint Type A alkyd paving paint.
- K. Expansion Joint Material: Pre-molded asphaltic cork filler strip VDOT Section 212.
- L. Pavement Marking Removal Paint: Black Traffic Paint, as manufactured by Baltimore Paint and Chemical Corporation, Baltimore, Maryland, or approved equal.
- M. Existing Pavement Marking Removal: Existing painted lines shall be removed and existing paving areas prepared for new painted lines by application of two coatings of VDOT Seal Coat, VDOT Section 312.
- N. Concrete: VDOT Class "A-4.0" (4,000 psi) General Use hydraulic cement concrete, Section 217.

- O. Concrete Reinforcement: ASTM A 185 welded wire mesh, size indicated, flat sheets.
- P. Stair Nosing: Cast-in type of abrasive nosing. Size as indicated, and of aluminum, or hot-dip-galvanized steel.
- Q. Stair Hand Rails: Size as indicated, and of aluminum. Hot-dip-galvanized may be substituted with approval of the Owner's Representative.
- R. Stair Hardware: As indicated, and of galvanized steel.
- S. Construction, Expansion and Isolation Joint Filler: ASTM D 994, bituminous preformed joint filler, 1/2 inch thick.
- T. Joint Sealant: Pourable Polyurethane sealant for use between building and concrete walk.
- U. Gravel Base: VDOT Aggregate: Section 208, Grade 21B.
- V. Forms: Steel or wood.
- W. Curing Materials: Burlap Mats: ASSHTO M 182, Class 1.
- X. Miscellaneous Products:
  - 1. Form release compound: Nonstaining and approved by the Architect.
  - 2. Cement Mortar: VDOT Section 218: Hydraulic Cement Mortar.
- Y. Other materials not specifically described but required for proper and complete installation of the work of this section, and subject to the approval of the architect.

### **PART 3 - EXECUTION**

#### **3.01 INSPECTION**

- A. Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

#### **3.02 BITUMINOUS CONCRETE**

- A. All asphaltic concrete shall be hot plant mixed, and shall be furnished from a commercial asphalt hot mix plant.
- B. The aggregates shall have a temperature between 275 degrees F and 325 degrees F when placed in the mixer. The liquid asphalt shall be heated to a

temperature between 275 degrees F and 350 degrees F, and shall be added during mixing.

- C. Mix the combined aggregates and liquid asphalt in a pug mill mixer with a capacity of not less than 3,000 pounds per batch. Continue the mixing for at least 45 seconds after all ingredients have been placed in the mixture, and until the liquid asphalt is distributed uniformly throughout the mixture.
- D. The mixture shall have a temperature between 290 degrees F and 320 degrees F when it leaves the plant.

### 3.03 PAVING

- A. Sub-grade preparation to achieve compacted sub-base shall be accomplished under the work of Section 02200, Earthwork. Prior to applying prime coat, carefully inspect sub-base surface and remove any loose materials.
- B. Proof roll compacted sub-base surface to identify soft or unstable areas requiring replacement and/or additional compaction. Do not begin paving operations until such areas have been corrected, and testing laboratory results indicate satisfactory compaction. Grade sub-base to profiles indicated on drawings.
- C. Place asphaltic concrete on sub-base; spread, grade and compact in accordance with VDOT standards. Place in strips at least 10' wide, except that small, inaccessible areas shall be placed by hand. Place and roll succeeding strips so as to overlap and blend with joints of previous strips.

### 3.04 ROLLING

- A. Begin rolling when mixture will bear weight of rolling without excessive displacement. Compact small, inaccessible areas with hand tampers or vibrating plate compactors.
- B. Perform initial rolling immediately after rolling of joints and outside edges. Inspect surface after initial rolling, and repair displaced or loosened areas.
- C. Follow initial rolling immediately after with second rolling while mixture is still hot. Continue until mixture is compacted.
- D. Perform finish rolling while mixture is still warm enough to allow removal of roller marks.
- E. Remove and replace paved areas found to be defective; cut out such areas and fill with fresh, hot mixture, and compact by rolling.

### 3.05 OVERLAY PAVING

- A. Extent of milling and overlay paving is indicated on the drawings. Provide minimum 2 inches thick VDOT SM 9.5 unless otherwise noted on the Drawings. All debris from milling operations shall be legally disposed of off site.
- B. Apply Tack Coat to surfaces of previously constructed asphaltic or portland cement concrete. Allow to dry prior to receiving overlay paving.
- C. Install protective membrane in accordance with manufacturer's installation instructions.
- D. Avoid smearing and splattering of adjoining curbs and gutters with overlay materials. Clean such surfaces when contaminated by overlay materials.

### 3.06 FINISH TOLERANCES

- A. Finish all surfaces to the following tolerances.
- B. Asphaltic Concrete Surfacing: Plus or minus 0.05' at any point from line and grade shown on the Drawings.
- C. Apply prime coat to compacted sub-base in accordance with the manufacturer's recommendations.
- D. Variations: Finished surfaces shall be free from birdbaths (sump areas), and shall show no variation from the designed elevations greater than 1/4" when checked with a 10'-0" straight edge.

### 3.07 FRAME ADJUSTMENTS

- A. Set frames of subsurface structures to final grade as a part of this Work, including adjustments of existing frames, and new frames furnished under other Work of Project.

### 3.08 PLACING FRAMES

- A. Surround frames set to elevation with a ring of compacted asphalt concrete base prior to paving.
- B. Place asphalt concrete mixture up to 1 inch below top of frame, slope to grade, and compact by hand tamping.
- C. Adjust frames to proper position to meet paving.
- D. If permanent covers are not in place, provide temporary covers over openings until completion of rolling operations.
- E. Set cover frames to grade, flush with surface of adjacent pavement.

### 3.09 EXISTING WORK DAMAGED BY CONSTRUCTION

- A. Where existing streets, roads, driveways, or other pavements have been cut, removed, or otherwise disturbed by new construction, they shall be repaired as follows.
1. The areas shall be backfilled and compacted, in accordance with the same standards as backfilling for new work, to secure a compaction of ninety-five percent (95%) of maximum density as determined by the standard proctor density test (ASTM D698) at 2 percent of optimum moisture content.
  2. All existing curbs and gutters, sidewalks, base course, and sod shall be replaced to appropriate line and grade to preclude the ponding of water, with construction similar in design and material as existing, or as otherwise specified.
  3. Wearing surface shall then be replaced with two inches (2") of bituminous concrete, designation SM-2A in accordance with the Virginia Department of Transportation Specifications.
  4. Existing paved areas to be patched shall be repaired using the proposed pavement section, as shown on the Contract drawings. All patching will occur immediately upon completion of the associated excavation activity, regardless of overall construction phasing.
  5. Existing areas to be patched lying within state right-of-ways shall be repaired in strict accordance with the Virginia Department of Transportation Standards and Specifications for such work and shall include a minimum of 25-feet of milling and overlay on each side of the patch.

### 3.10 MARKING ASPHALT CONCRETE PAVEMENT

- A. Sweep surface with power broom supplemented by hand brooms to remove loose material and dirt.
- B. Do not begin marking asphalt concrete pavement until authorized by the Architect/Owner.
- C. Apply paint with mechanical equipment.
- D. Provide uniform straight edges.
- E. Apply not less than 2 separate coats in accordance with manufacturer's recommended rates.

### 3.11 CURBS AND GUTTERS



- A. Provide VDOT 21-A stone (6" thick) compacted to 95% proctor density under all curbs and gutters (per AASHTO-T99-61), with minimum 8" sub-base per VDOT Specification 21-A.
- B. Set forms to line and grade.
- C. Install forms over full length of curb, gutter, or sidewalk.
- D. Position integral curb joints at same location as pavement joints.
- E. Form contraction joints using steel templates or division plates.
- F. Remove templates or plates as soon as concrete has hardened sufficiently to retain its shape.
- G. Install expansion joint material behind curb at abutment to sidewalks, curb returns and adjacent structures.
- H. Place top of expansion joint material 1/2 inch below curb surface.
- I. Apply asphalt sealer on top of expansion joint material flush with concrete surface.
- J. Consolidate concrete with mechanical vibrators.
- K. Round face of curbs at top with finishing tool of correct radius.
- L. Finish exposed surfaces with wood float followed by light brushing with broom, brush or burlap.
- M. Apply curing material and cure for 7 days.

### 3.12 INSTALLATION

- A. After the subgrade has been inspected and approved by the inspector, curb and gutter and transverse curb and gutter shall be constructed where shown on the Drawings.

### 3.13 SIDEWALKS AND RAMPS

- A. Concrete sidewalks and ramps shall be constructed to the widths and at the locations shown on the Drawings. Include woven wire fabric 6 x 6 - W1.4 X W1.4 in all walks.
- B. Provide one course concrete construction, 4" thick over 6" gravel base and sub-grade compacted to 95% maximum density at optimum moisture.

- C. Expansion joints shall be 1/2 inch wide spaced maximum 16 feet on center in two directions. Provide where walks abut buildings, curbs, platforms, etc. Premolded expansion strips shall extend full width and depth of walk. All joints to be sealed with gray colored self-leveling joint sealant.
- D. Score walks with hand tooled joints at 4'-0" intervals, unless denoted at closer intervals on Drawings, in two directions maximum for their full width and to a depth of at least 1/3 walk thickness (no saw cut joints allowed).
- E. Provide a lightly brushed finish.
- F. See Drawings for areas where reinforcing and gravel fill are required at entrances.
- G. Where existing sidewalks are to be joined or replaced by new sidewalks, saw cut and remove those sections of existing sidewalks indicated on the Drawings to be removed.
- H. Ends of existing sidewalk shall be cleanly saw cut and a 1/2" thick expansion joint filler installed between new and existing work.
- I. Asphalt walks shall be constructed to the widths and at locations indicated on Drawings.
- J. Curb ramps shall comply with Virginia Department of Transportation Standards and Specification for Type CG-12.
- K. Protect completed concrete work from damage. Remove and replace damaged or defective work.
- L. Underdrains in accordance with VDOT's standards shall be provided where the sidewalk is located within area with high ground water or wet soil conditions.

### 3.14 GENERAL CONCRETE NOTE

- A. Expansion joints in the sidewalk, between sidewalk and curb and gutter, and gaps between the sidewalk and the building wall shall receive urethane based caulking on school property.

### 3.15 PATCHING

- A. Patch to match material, color, and texture of surrounding area.
- B. Remove and replace defective work.
- C. Uniform smooth surface shall be achieved between the patched area and existing asphalt surface

## 3.16 PROTECTION

- A. After final rolling, do not permit vehicular traffic on asphalt concrete pavement until it has cooled and hardened. Erect barricades as required.
- B. Provide barricades and warning devices as required to protect pavement and the general public.
- C. Cover openings of structures in the area of paving until permanent coverings are placed.

## 3.17 AS-BUILT DRAWINGS

- A. Provide electronic as-built drawings in current version of AutoCAD and PDF format, and two full-sized hard copies, prepared by a certified land surveyor practicing in the Commonwealth of Virginia for all new curb and gutter, sidewalks, buildings, parking, and site improvements. Obtain necessary county approvals of as-builts from DPWES, and the supplying water company as required. The Contractor shall be responsible to address and satisfy all review comments to ensure approval of the as-builts and final release. Provide preliminary draft of as-builts for review by Engineer of Record after final grade achieved for Curb & Gutter, Sidewalk, Parking, etc. Final owner acceptance of new construction and release of contractor obligations shall not occur until the as-built drawings are approved, and the work is accepted, by Fairfax County DPWES and the Owner.

END OF SECTION

## SECTION 02721

### STORM/SANITARY SEWERS AND WATER MAINS

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specifications Sections, apply to this Section.

##### 1.02 RELATED WORK

- A. Section 02200, Earthwork: Requirements for excavation, water control, filling and backfilling, identification tapes, and protection of existing utilities apply to this Section, except as modified by specific provisions of this Section.
- B. Refer to specific sections of Division 15 for requirements related to interior water supply, storm and waste systems, and installation of tracer wire for nonmetallic sanitary piping.

##### 1.03 REFERENCED STANDARDS

- A. Fairfax County Public Facilities Manual
- B. Fairfax Water Construction Standards
- C. Falls Church Water Authority Construction Standards
- D. Fairfax County Fire Prevention Code
- E. Virginia Department of Transportation Standards
- F. International Plumbing Code (IPC)

##### 1.04 WORK INCLUDED

- A. The work covered by this Section of the Specifications consists of furnishing all plant, labor, equipment, appliances and materials, installations and tests complete and ready for use the sanitary sewer, storm drainage system, and water mains as indicated on the Drawings. This includes, but is not limited to, clearing, grubbing, trenching, backfilling, laying, lining, joining, and dewatering.
- B. All existing utility access structures, including, but not limited to, manhole covers and clean outs, shall be raised to new paving elevations where overlay paving or re-grading for new asphalt or concrete paving is indicated on the Drawings.

**PART 2 - PRODUCTS**

## 2.01 Cleanouts

- A. J.R. Smith 4111L-U for cleanouts with Capitol Foundry of VA, Inc. VB-9\*S frame and access cover placed in a 24" x 24" x 6" concrete pad. Size matching pipe size indicated. Contractor shall provide Owner with two "T" handles for recessed plugs.

- 2.02 All other products shall be as specified on the contract drawings and meet all applicable codes.

**PART 3 - EXECUTION**

## 3.01 TRENCHING, BEDDING AND BACKFILLING

- A. Trenches shall be opened only as far in advance of pipe laying as the Owner's Field Representative shall permit. When PVC or concrete pipe is to be laid, the width of the trench at and below the top of the pipe shall not exceed the outside diameter of the pipe plus eighteen (18) inches except that, for pipes twelve (12) inches or less in diameter, the trench width shall not exceed thirty-three (33) inches. The trench walls above the top of the pipe may be sloped or the trench above the top of the pipe may be widened as necessary for placing sheeting and bracing. All trench walls shall be vertical, where possible. The Contractor shall obtain permission from the Owner's Field Representative prior to sloping trench walls. Where cast iron pipe lines are to be laid, the trench shall be only as wide as required for the full performance of the work; however, bell holes shall be cut for the proper making of joints. To receive either sanitary sewer or storm sewer pipe, the bottom of the trench shall be shaped to the radius of the exterior diameter of the pipe to support one fourth (1/4) of its circumference. Excavation in ditches and at manholes and similar structures shall be kept free of water at all times until the pipes have been laid, properly jointed and backfilled. No trench shall be opened until adequate pumping equipment is available to dewater it.
- B. Trenches for sewers and storm drains shall be excavated to the alignment and depths required to allow installation of pipes and sand/gravel bedding as shown on the Drawings. The elevations shown on the Drawings are the inside flow line of the pipe, and the trench shall be excavated so as to provide for the pipe thickness below these grades for storm sewers, and the required gravel for sanitary sewers. (See latest Fairfax County Public Facilities Manual for Specifications). The lengths on the Drawings are center-to-center of structures.
- C. The bottom of the trench for storm and sanitary sewer pipes shall be graded flat with the pipe bedded in a compacted granular material. The granular material shall be crushed stone or pea gravel that will pass a 1/2" sieve but will be retained on a No. 4 sieve. The granular bedding shall have a minimum thickness of 1/4 the outside pipe diameter and shall extend halfway up the pipe barrel at

the sides. Such bedding shall be extended up to six-inches above the pipe where required by the IPC or the PFM.

1. If unsatisfactory material is found at the grades shown on the plans for the sewers and structures, the Contractor shall make any additional excavations as directed by the Architect or Owner. Such excavations shall be backfilled with washed gravel or crushed stone for storm sewers or Class "B" concrete for sanitary sewers as directed by the Architect or Owner's Representative.
  2. For all storm, sanitary lines and laterals, provide insulated tracer wire in accordance with IPC 703.6.
- D. All trenches and excavations shall be properly sheeted and braced, to ensure the safety of personnel, protection of the work, to maintain the maximum trench widths specified on the drawings and to prevent the disturbance or settlement of adjacent foundations and structures. Bracing shall not place any stress on portions of the completed work until the pipe installation has proceeded far enough to provide ample support. Safety precautions to prevent injury or loss of life are the responsibility of the Contractor. Damage to new or existing structures which occurs through settlement, water or earth pressure, slides, caves, or other causes due to failure or lack of sheeting or bracing, or to improper bracing, is the Contractor's responsibility and shall be repaired at his own expense. No extra payment will be made for sheeting and bracing.
- E. Backfill around and immediately over the pipe with select material free from stones or other adverse materials and carefully compact. The balance of the backfill shall be with excavated material approved by the Architect or the Owner. Material shall consist of sand and gravel or other approved materials, and shall be free from frost and large clods of earth or stones larger than three (3) inches in diameter. The backfill shall be deposited in six (6) inch lifts and shall be thoroughly and carefully compacted to 95% of maximum density, as determined by the Standard Proctor Density Test (ASTM D698) at two (2) percent of optimum moisture content in both excavations for structures and pipe trenches. The lifts shall be brought up evenly. Any deficiency in the quantity of material for backfilling or for filling depressions caused by settlement shall be supplied and placed by the Contractor. The compaction for the backfilling shall be executed in such a manner that there will be no settlement or depression in the finished grade. Should depressions appear, the area shall again be compacted until there is no further settlement, and brought to finished grade.
- F. If the excavated material is not suitable to use as "backfill," the Architect or Owner's Representative shall designate suitable borrow material onsite or offsite to use as backfill. This substitution shall be accomplished at no additional cost to the Owner.

### 3.02 INSTALLATION OF CONCRETE PIPES

- A. The pipe shall be bedded true to line and grade.

- B. All concrete pipe sewers shall be laid with bells upgrade. The sections of the pipe shall be so laid and fitted together that the completed sewer will have a smooth and uniform invert. The pipe shall be kept thoroughly clean so that jointing materials will adhere. Each pipe shall be inspected for defects before being lowered into the trench. The interior of the pipe shall be clean at the time of laying and shall be kept clean as the work progresses.
- C. Sanitary Sewer Piping:
1. All joints shall be encased in cement mortar consisting of 1 part Portland Cement and one-and-one-half (1-1/2) parts clean, sharp sand with only enough water for workability.
  2. In jointing, the groove should be carefully washed with a wet brush and the bottom half of the groove end buttered with mortar. The tongue of the next section of pipe shall be cleaned with a wet brush and a layer of mortar shall be applied to the top half thereof. This tongue end shall then be inserted into the groove end of the first pipe until mortar is squeezed out into the inner and outer surfaces. The inner surface of the joint shall then be wiped smooth and the outside joint shall be pointed up with a bead of mortar. Joints shall not be covered until authorized by the Owner's Representative.
- D. Storm Sewer Piping:
1. All joints shall be sealed using bituminous pipe joint compound (Monsey products or equal).
- E. The ends of pipes, which enter structures, shall be neatly cut to fit the inner face of the masonry. After joints have been inspected and approved, pipes shall be backfilled as previously specified. Care shall be used so that pipes are not displaced in elevation or alignment during backfilling.
- F. Roof drains shall be installed in accordance with Fairfax County Plumbing Standards and Specifications as well as Public Facility Manual.
- G. High Density Polyethylene (HDPE) Pipes shall be installed in accordance with manufactures specifications and Fairfax County Public Facility Manual Specifications

### 3.03 STRUCTURES

- A. All storm sewer structures shall conform to Fairfax County and Virginia Department of Transportation (VDOT) Standards and Specifications, or to the special designs shown on the plans.
- B. All sanitary sewer structures shall conform to the current Fairfax County Standards and Specifications for such work.

- C. Tops on all structures shall not be set until all grading is complete to allow for any adjustment of tops that may be required.
- D. All joints shall be parged in accordance with Fairfax County and VDOT's Standards and Specifications as applicable.
- E. All connections to existing structures shall be in accordance with Fairfax County and VDOT's Standards and Specifications as applicable.

#### 3.04 STORM SEWERS

- A. All storm sewers shall be constructed in strict accordance with the current requirements of the Fairfax County Standards and Specifications, Department of Public Works and Environmental Services and Virginia Department of Transportation (VDOT) Standards and Specifications.
- B. All pipe installed shall be of the type, size and class indicated on the Drawings. Non-reinforced concrete pipe, and bell and spigot fittings shall conform to latest ASTM C-14 Specifications. Reinforced concrete sewer pipe shall conform to ASTM C-76-62T, Class III. Reinforced concrete culvert pipe shall conform to the ASTM C361 with rubber gasket joints for dry detention facilities and AWWA C300 or C301 for wet facilities, Class III or ASTM C-76-62T, 6,000 pound, centrifugally spun Class III or IV as indicated on the plan.
- C. The Contractor shall install where, and as shown on the Drawings, the rubble rip-rap and concrete aprons. Methods of construction and material shall conform to Virginia Department of Transportation and Fairfax County Department of Public Works and Environmental Services Specifications. Rubble riprap and concrete aprons shall be provided to prevent erosion at outfalls. Concrete aprons shall be provided to smooth entrance to storm sewer system.
- D. The contractor shall pay for, provide, and obtain approvals for all tests required by VDOT, Fairfax County and other applicable agencies and jurisdictions for approval and/or acceptance. Such tests shall include but not be limited to, Visual Inspections, Video Inspections, Deflection Testing, Pipe Evaluation in accordance with the Public Facilities Manual Chapter 2 and the VDOT Test Methods Manual. Provide copies of all tests to the Architect.
- E. Video record/inspection for all storm sewer pipes must be performed by the contractor no later than 30 days after completion of installation and final fill/pavement unless deemed unnecessary by Fairfax County Public Schools.

#### 3.05 INSTALLATION OF SANITARY SEWERS

- A. All sanitary sewers shall be constructed in strict accordance with the current Fairfax County Standards and Specifications, Department of Public Works (DPW) and the IPC as applicable.



- B. The contractor shall pay for, provide and obtain approvals for all tests required by the applicable agencies and jurisdictions for approval and acceptance. Such tests shall done in accordance with the Public Facilities Manual Chapter 10 and the International Plumbing Codes as adopted. Provide copies of all tests to the Architect.

### 3.06 WATER MAINS

- A. All water mains shall be constructed in strict accordance with the current standards and specifications of the supplying Water Company, as indicated on the Drawings. (See Plumbing Specifications for copper water lines, drinking fountains, box hydrants, and all interior plumbing). Contractor shall furnish and install all pipe, valves, boxes, hydrants, fittings and any other appurtenances necessary to provide water service. The Contractor shall obtain and pay for all permits, applications, etc., necessary to install water service. Meter shall be furnished by the Owner and installed by the Contractor as part of the Work of Division 15 Plumbing Sections.
- B. Water line tap shall be in accordance with the standards and specifications of the supplying water company.
- C. All new water mains, fire lines and domestic supply lines shall be encased in polywrap using current Fairfax Water Standards.
- D. The contractor shall pay for, provide and obtain approvals for all tests required by Fairfax Water and other applicable agencies and jurisdictions for approval and acceptance. Such tests shall done in accordance with the local jurisdiction's requirements and the International Plumbing Code as applicable. Provide copies of all tests to the Architect.

### 3.07 AS-BUILT DRAWINGS

- A. Provide electronic as-built drawings in current version of AutoCAD and Pdf format and two (2) full sized hard copies prepared by a certified land surveyor practicing in the Commonwealth of Virginia for all new storm and sanitary sewer work, water mains and appurtenances. Obtain necessary county approvals of as-builts from DPWES, and the supplying water company as required. Contractor shall provide to the Owner one hard copy of as-builts that display Fairfax County DPWES and/or Fairfax Water approval stamps. Final Owner acceptance of new construction and release of contractor obligations shall not occur until the as-built drawings including both the site as-built and sanitary as-built are approved, and the work is accepted, by the Fairfax County DPWES and the Owner.

END OF SECTION

**SECTION 02749  
SAND/RUBBER SYNTHETIC TURF FIELD SURFACE REPLACEMENT  
AND RELATED WORK**

**PART 1 – GENERAL**

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and Division 1 Specifications Sections, apply to the Work of this Section, with special attention to the following:
  - 1. Shop Drawings, Product Data and Samples: Section 01340
  - 2. Project Record Information: Section 01720
  - 3. Operating and Maintenance Data: Section 01730
  - 4. Warranties and Bonds: Section 01740

1.02 RELATED WORK

- A. Site Preparation: Section 02100
- B. Base Construction and Related Work Synthetic Turf Field System: Section 02752

1.03 DESCRIPTION

- A. This project is a synthetic turf replacement in which the contractor shall furnish all labor materials, materials, equipment and tools necessary to remove an existing synthetic turf surface with infill and install a typical Sand/Rubber In-Fill Synthetic Turf System as indicated on the drawings and as specified herein. The installation of all new materials shall be performed in strict accordance with the Synthetic Turf Manufacturer's instructions and in accordance with all approved shop drawings. A Synthetic Turf System includes all earthwork, base construction and athletic field surface.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements and references as listed below are the current guidelines set forth by the governing bodies listed. All work under this Section shall conform to the latest edition as applicable:
  - 1. American Society for Testing and Materials (ASTM)
  - 2. Consumer Product Safety Commission (CPSC)
  - 3. International Hockey Federation (FIH)
  - 4. National Collegiate Athletic Association (NCAA)

5. National Federation of State High School Association (NFHS)
  6. National Recreation and Park Association (NRPA)
  7. USA Field Hockey
  8. US Lacrosse Foundation
  9. United States Soccer
- B. The Contractor must employ competent workers skilled in the installation of Synthetic Turf as outlined in Section 1.05.
- C. The designated supervisory personnel on the project must be certified in writing by the Synthetic Turf Manufacturer as competent in the installation of this material, including sewing seams and proper installation of the infill mixture.
- D. The Contractor is responsible for reviewing and certifying that the proposed subgrade, drainage, and laser grading are completed in accordance with the contract documents prior to the installation of the Synthetic Turf, that the Synthetic Turf system being supplied and installed meets or exceeds the design criteria of the specifications, and that the site conditions exceed the minimum requirements of the system's design performance standards as set by the Synthetic Turf Manufacturer. Installation of synthetic field surface materials may not commence until the Engineer receives the final acceptance of finished crushed stone/aggregate base from the synthetic turf field manufacturer.
- E. The Contractor is required to use a licensed Land Surveyor registered in the State of VA for all layout and engineering work.
- F. In-fill materials will be tested by the Owner for conformance to the specification.

#### 1.05 EXPERIENCE

- A. Firm Experience:
1. The Synthetic Turf System shall be installed by an experienced Contractor who shall provide a list of twenty-five (25) completed field installations in the United States within the last three years performing business under the name of the current installation company, providing specific information about the name of the product, contact names, addresses, telephone numbers, year of the installation and type of infill material for the following type of fields:
    - A. A soccer field and a football field of 70,000 sq. ft. or larger.
    - B. A list of synthetic turf fields, other than soccer or football.

2. The list shall include a minimum of twenty-five (25) fields that have been approved for game play by one of the following associations:
    - A. National Collegiate Athletic Association-(NCAA)
    - B. National Federation of State High School Associations
    - C. Federation Internationale de Football Associations (FIFA)
    - D. National Recreation and Park Association (NRPA)
  3. The contractor performing the turf removal equipment shall have removed a minimum of 5 fields over the past two years.
  4. The Contractor may use Subcontractors/Installers who employ only qualified and experienced Supervisors and Technicians skilled in the installation of the Synthetic Turf.
  5. The contractor shall have a minimum of one (1) certified field builder on staff through American Sports Builders Association (ASBA).
- B. Principal Staff Experience:
1. The Contractor shall detail the experience, educational background and training of the proposed principal staff, as follows:
    - A. Contract Manager- The Contract Manager shall be a current and qualified employee of the Contractor; be skilled in the performance of the assigned duties; and have a minimum of three years experience managing or supervising similar sized projects.
    - B. Supervisor- The supervisor shall be a current and qualified employee of the Contractor; be skilled in the performance of the assigned duties; have a minimum of eighteen months experience in supervising similar sized projects; and have installed In-Fill Synthetic Turf System products a minimum of twenty-five (25) installations.
    - C. The turf installation crew personnel qualifications shall include the individuals' resume, project list and contact information. Such information shall clearly identify the experience and qualifications in performing the type of work covered by these Specifications. All information provided shall include a description of the identified projects, and the name and telephone number of a responsible contact person who can verify the information provided.
    - D. The Contractor shall not replace the named individuals for the duration of the contract unless the substitute individuals have equivalent qualifications as approved by the Owner.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in sealed unopened containers with manufacturer's labels intact.
- B. Store materials in protected area at a temperature not to exceed maximum and minimum temperatures as recommended by manufacturer. Protect products from UV degradation.

1.07 SUBMITTALS

- A. All submittals shall be directed to the Owner and Engineer electronically for distribution. The contractor may only send paper submittals where applicable.
- B. One sample of Synthetic Turf, a minimum of 12 x 12 inches in size, illustrating details of the finished product.
- C. One sample of Shock Pad, a minimum of 12 x12 inches in size, illustrating details of the finished product. (If Alternate Selected)
- D. A letter and specifications sheet certifying that the products of this specification Section meet or exceed specified requirements.
- E. Submit Certified copies of independent (third-party) laboratory reports on ASTM tests as follows for Synthetic Turf carpet:
  - 1. Specific Gravity and Density of Plastics by Displacement, ASTM D792
  - 2. Tuft Bind without Infill, ASTM D1335
  - 3. Melt Point Index, American Association of Textile Chemists and Colorists #20 (AATCC #20)
  - 4. Total Product Weight without Infill, ASTM D5848
  - 5. Average Pile Yarn Weight, ASTM D5848
  - 6. Average Tuft Height, ASTM D5823
  - 7. Grab Tear Strength, ASTM D5034
  - 8. Breaking Strength of Textile Fabrics (Length) – Glued or Sewn Seam Turf Sample, ASTM D5034
  - 9. Pile Height, Face Width & Total Fabric Weight, ASTM D5848
  - 10. Methanamine Pill Test ASTM D2859
  - 11. Impact Attenuation, GMax, ASTM F355/F1936

12. Coefficient of Friction, ASTM F1551
  13. Water Permeability with Infill, ASTM D4491
  14. Abrasiveness, ASTM F1015
  15. Primary Backing Weight, ASTM D5848
  16. Secondary Backing Weight, ASTM D5848
  17. Machine Gauge, ASTM D5793
  18. Yarn Dernier, ASTM D1577
  19. Fiber Thickness, ASTM D5034
  20. Average Fiber Break Strength and Elongation, ASTM D2256
  21. Accessibility of Surface, ASTM F1951
  22. Heavy Metal Content for all metals in fiber and infill, ASTM F2765-09
- F. One copy of the Synthetic Turf Manufacturer's insured non-prorated warranty and Insurance policy information.
- G. Shop drawings indicating:
1. A Field Layout with tufted/inlaid lines
  2. Field Marking Plan and details for all fields shown.
  3. Roll/Seaming Layout.
  4. Methods of Attachment, Field Openings and Perimeter Conditions
  5. Synthetic Turf Manufacturer's technical product data literature
  6. Sewing/Adhesives technical specification
  7. Sieve Analysis of Sand and Cryogenic Rubber In-Fill
  8. Sample of Cryogenic Rubber and Sand from actual source supplier
  9. Base and Finish Aggregate Stone source and material specification/certification
  10. Drainage Piping specifications

11. Concrete Curb Edging details
  12. Concrete Mix design
  13. Asphalt Mix design
  14. Seed Mix and sod supplier
  15. Specifications for soccer goal posts, backstays, and ground sleeves
  16. Synthetic Turf Field maintenance equipment specifications and cut sheets
  17. Material Safety Data Sheet (MSDS) for rubber infill, turf backing system, and glue (if applicable)
  18. Method of attachment, field openings and perimeter conditions
- H. The Contractor shall submit a statement of the origin, composition, and manufacturer of all materials to be used in the work, including optional or alternate items.
- I. The Synthetic Turf Manufacturer's name, type and composition of fiber.
- J. Sieve analysis of the infill rubber and sand with a certification that the drainage rates comply with the Synthetic Turf Manufacturer's requirements.

#### 1.08 WARRANTY

- A. The Synthetic Turf Manufacturer shall provide a Warranty to the Owner that covers defects in materials and workmanship of the Synthetic Turf for a minimum period of eight (8) years from the date of Substantial Completion. The Synthetic Turf Manufacturer must verify that their on-site Representative has inspected the installation and that the work conforms to the Synthetic Turf Manufacturer's requirements.
- B. The Synthetic Turf Manufacturer shall provide a Warranty to the Owner that covers defects in materials and workmanship of the Synthetic Turf for a period of eight (8) years from the date of Substantial Completion. The Synthetic Turf Manufacturer shall include coverage for damage caused from UV degradation or defects in workmanship and materials in the manufacturing or installation of the Synthetic Turf. All Synthetic Turf warranties shall include repair or replacement of the affected areas and include all necessary materials, labor, transportation costs, etc. to complete the required repairs.
- C. The synthetic turf system shall drain vertically a minimum of 14 inches per hour without prolonged accumulation of surface water. If the synthetic turf system does not drain in accordance with this Specification, then punching the carpet backing or any method creating additional holes in the backing other than the designed

drainage holes will not be permitted. The removal and replacement of the infill will be permitted given there is not damage to the fibers in the process.

- D. The Synthetic Turf Manufacturer's Warranty must be supported by a pre-paid insured warranty policy. A copy of the policy must be provided with the Bid Submittal and include the following information and features:
1. Name of the carrier
  2. Method for payment of the policy (must be pre-paid and non-cancelable).
  3. Insured warranty shall be provided by a third-party insurer with an A.M. Best financial strength rating of A- or better.
  4. The policy shall not be a re-insurance or off-shore policy or a letter of credit.
  5. Insured warranty coverage shall be for the full 100% replacement value of the total square footage installed.
  6. Insured warranty coverage shall apply to the full 8-year period from substantial completion date of project with no uninsured periods or periods of self-insurance.
  7. The insured warranty policy must have a zero deductible.
  8. Insured warranty policy coverage shall specifically provide for reimbursement to the warranty holder (i.e. the Participating Public Agency) in the event of a bankruptcy of the synthetic turf provider.
  9. Insured warranty coverage shall apply to playing surface inclusive of infill, seaming, labor and colored inlays for event markings.
  10. Insured warranty coverage shall not have exclusions for epidemic or catastrophic failure.
  11. Insured warranty coverage shall not limit the hours of use.
  12. Insured warranty coverage shall not exclude heavily trafficked areas or related uses such as team or band practices.
  13. Insured warranty coverage shall not exclude any colored turf fibers.
  14. Insured warranty coverage shall offer a minimum claim limit of Five Million Dollars (\$5,000,000) in the aggregate per annum.
  15. Insured warranty coverage shall offer a minimum claim limit of Five Hundred Thousand Dollars (\$500,000) per field.
  16. Additional insured warranty policy features of importance.



- E. The contractor shall provide one Gmax test at completion and one Gmax test at the one year warranty anniversary.

## PART 2 – PRODUCTS

### 2.01 MATERIALS

- A. The only approved Synthetic Turf products identified for the purpose of this bidding solicitation are:

- |    |                               |                                  |
|----|-------------------------------|----------------------------------|
| 1. | Field Turf                    | 2.5” – 13,000 Denier (Slit Film) |
| 2. | Astroturf                     | 2.5” – 13,000 Denier (Slit Film) |
| 3. | A-Turf                        | 2.5” – 13,000 Denier (Slit Film) |
| 4. | Shaw Sports Turf              | 2.5” – 13,000 Denier (Slit Film) |
| 5. | Hellas Sports<br>Construction | 2.5” – 13,000 Denier (Slit Film) |
| 6. | Sprinturf                     | 2.5” – 13,000 Denier (Slit Film) |

Selection of these products represents the required minimum performance criteria as outlined herein. The manufacturer’s performance criteria and product properties and declarations both physical and chemical are as represented by the manufacturers at the time of this solicitation. Approved equals must be pre-bid approved.

- B. The Synthetic Turf material and resilient cryogenic rubber/sand infill shall be in accordance with the following:

1. The Slit Film fiber shall be tufted with (2) end per needle to achieve 13,000 minimum denier with one (1) fiber less than 8000 denier and 100 micron thickness 100% polyethylene, low friction fiber, measuring not less than 2.50”-inches high, product as manufactured by, Controlled Products, Shaw, Bonar Yarns & Fabrics. TTC/Polyloom, Ten Cate Thiolon, or equal. The low friction fiber shall be specifically designed to minimize abrasion.
2. The tufted fiber weight shall not be less than 54 ounces per square yard for manufacturers using a sand/cryogenic rubber infill mix. The fiber shall be tufted on a 3/8 inch to a 1/2 inch gauge at a stitch rate determined by manufacture in order to achieve specified face weight. The overall product weight must not be less than 60 ounces per square yard. The low friction non-abrasive fiber shall be 100% polyethylene, treated with a UV inhibitor. Systems that use polyethylene/polypropylene blended fibers and systems that include any type of nylon fibers are unacceptable.

3. The primary backing shall consist of a backing with a minimum weight of 7 ounces per square yard. The secondary backing shall consist of an application of polyurethane or urethan (minimum of 18 ounces per square yard) heat activated to permanently lock fiber tufts in place. Products using latex based secondary backings will not be acceptable. The Synthetic Turf system shall be perforated with a minimum of 1/8" inch diameter holes every 3/16" of an inch at 14" per hour.

A summary of the required properties for the installed Synthetic Turf properties are as follows:

| <u>Testing Standards</u> | <u>Specifications</u>    | <u>Properties</u>                        |   |
|--------------------------|--------------------------|--|---|
| A.                       | ASTM D1577               | Fiber Denier(A)<br>Fiber Denier(B)       | 8,000 (min) – Slit Film<br>5,000 (min)- Slit Film           |
| B.                       | ASTM D3218               | Fiber Thickness                          | 100 microns (min) – Slit Film                               |
| C.                       | ASTM D5823               | Pile Height                              | 2.5" inches nominal (minimum)                               |
| D.                       | ASTM D5848               | Pile Weight                              | 54 oz./sq. yd. (minimum)                                    |
| E.                       | ASTM D1335               | Tuft Bind without Infill                 | 8 lbs./force (minimum)                                      |
| F.                       | ASTM D5848               | Primary Backing                          | 7 oz./sq. yd. (minimum)                                     |
| G.                       | ASTM D5848               | Secondary Backing                        | 18 oz./sq. yd. (minimum)                                    |
| H.                       | ASTM D5848               | Total Product Weight<br>(without Infill) | 60 oz./sq. yd. (minimum)                                    |
| I.                       | ASTM D5793               | Machine Gauge                            | 3/8 inch to 1/2 inch  |
| J.                       | ASTM D5034               | Grab Tear (width)                        | 200 lbs./force (minimum)                                    |
| K.                       | ASTM D5034               | Grab Tear (length)                       | 200 lbs./force (minimum)                                    |
| L.                       | ASTM F1015               | Relative Abrasiveness<br>Index           | Ranges between 14 and 22                                    |
| M.                       | ASTM F2765               | Total Lead Content                       | Less than 50 ppm  |
| N.                       | ASTM D4491               | Water Permeability                       | >=14 inches/hour (minimum)                                  |
| O.                       | ASTM D2859               | Flammability (Pill Burn)                 | Pass  |
| P.                       | ASTM F355/<br>F1936      | Impact Attenuation                       | =<120 at installation (GMax)<br>=<165 over life of warranty |
| Q.                       | ASTM F1951               | Accessibility of Surface                 | Present Test Findings                                       |
| R.                       | ASTM F2765               | Heavy Metal Testing                      | **Present Test Findings                                     |
| S.                       | Headspace GC/MS          | VOC Testing                              | **Present Test Findings                                     |
| T.                       | Solvent extraction GC/MS | - PAH Testing                            | **Present Test Findings                                     |

\*\* Test findings shall comply with EPA soil and drinking water standards.

4. The carpet shall be delivered in 15' wide rolls. The rolls shall be of sufficient length to go from sideline to sideline of the soccer field. Head seams between the sidelines of the football field will not be acceptable.
- C. All field lines, numbers and markings indicated on the drawings shall be permanently inlaid.

- D. The fiber shall be green in color to simulate natural grass as closely as possible, treated with UV inhibitor, and guaranteed for a minimum of eight years.
- E. Infill Material: The infill system shall be graded, cryogenically hammer-milled SBR rubber. The rubber shall be free of all dust, toxic materials and metals. The proposed cryogenic rubber and sand infill shall be clean material and shall be tested for compliance. The sand shall be select and graded dust-free silica sand. Depth of material at completion of placement shall be 1 7/8" inches (± 1/16 inches) and as required to reach the required initial and subsequent Gmax ratings. Samples of both the cryogenic rubber and sand shall be submitted to the Owner for approval prior to installation.

Silica sand within the infill mix, 35% to 50% by weight, will meet the following size distribution:

| U.S. Mesh | Metric (mm) | % Retained per sieve |
|-----------|-------------|----------------------|
| 16        | 1.190       | 0                    |
| 20        | 08.840      | 0-3                  |
| 25        | 0.710       | 10-30                |
| 30        | 0.590       | 30                   |
| 35        | 0.500       | 15-35                |
| 40        | 0.420       | 5-15                 |
| 50        | 0.297       | <5                   |
| 70        | 0.210       | Trace                |

Sand will consist of uniform, sub-angular to rounded, single grains. **It will be dust-free**, and un-ground. Crusher fines are unacceptable.

Cryogenic rubber shall be governed by the following specifications:

Size Specifications for Cryogenically Ground 10-20 Rubber

$$1.60\text{mm} < D_{50} < 1.75\text{mm}$$

$$1.10 < D_{60}/D_{10} < 1.40$$

$$0.80 < \frac{D_{30}^2}{D_{10} D_{60}} < 1.20$$

Where Dx represents the grain size for which x% of the rubber is smaller. i.e., if D<sub>50</sub> = 0.7mm, this means that 50% of grains (by weight) are smaller than 0.7mm. The shape of the rubber particles shall be granular (edges shall not be stringy). As an approximation, the following ranges of values for the sieve analysis are acceptable:

| MILLMTR | MICRONS | US MESH | % RETAINED |
|---------|---------|---------|------------|
| 2.38    | 2380    | 8       | 0-3%       |
| 2.00    | 2000    | 10      | 0-15%      |

|       |      |    |        |
|-------|------|----|--------|
| 1.68  | 1680 | 12 | 10-30% |
| 1.41  | 1410 | 14 | 20-40% |
| 1.19  | 1190 | 16 | 10-30% |
| 0.841 | 841  | 20 | 15-30% |
| 0.595 | 595  | 30 | 0-5%   |

- F. The exposed fiber height above the infill material shall be approximately 5/8" of an inch +/-1/16" of an inch. The entire Synthetic Turf system shall be resistant to bacterial and fungal growths.
- G. Surplus Materials: The Contractor shall provide the Owner, at each installation as a part of the Contract, the following surplus materials transported to storage location selected by the Owner:
  - 1. Synthetic Turf Fabric (green) – 500 square feet with at least one piece fifteen (15) feet by thirty (30) feet.
  - 2. Synthetic Turf Fabric (White, Yellow, Blue, Orange, Red or any other colors)- 50 linear feet each.
  - 3. Infill Material – as required to infill 500 square feet. This material shall not be used by the Synthetic Turf Subcontractor to maintain depth and GMax values during the warranty period. The Contractor must provide material, matching the existing infill material, during the warranty period at no cost to the Owner.

2.02 EQUIPMENT

- A. Refer to plan details and specification section 02752 for athletic accessories including permanent and/or portable goals.

**PART 3 - EXECUTION**

3.01 GENERAL

- A. The installation of the Synthetic Turf System shall be performed in full compliance with approved Shop Drawings.
- B. All designs, markings, layouts, and materials shall conform to all applicable and current National State High School Federation rules and other standards that may apply to this type of Synthetic Turf installation.
- C. Only trained technicians, skilled in the removal and installation of athletic caliber synthetic turf systems working under the direct supervision of the approved installer supervisors, shall undertake any cutting, sewing, gluing, shearing, topdressing or brushing operations.

- D. Only trained technicians, skilled in the removal of synthetic turf systems working under the direct supervision of the approved contractor, shall undertake any cutting, removal or disposal operations. **All work during the turf cutting and removal process shall take place only on the existing turf surface to avoid damage to the existing base and infrastructure.**
- E. The designated Supervisory personnel on the project must be certified, in writing by the turf Manufacturer, as competent in the installation of this material, including sewing seams and proper installation of the Infill mixture.

### 3.02 PRE INSTALLATION MEETING

- A. Convene one week before starting work of this section with contractors involved, turf manufacturer's representative, Engineer and owner.
- B. Pre-installation meeting is required between general contractor, turf Installation Company, turf removal contractor and base contractor prior to removing and installing the synthetic turf system. The subsurface conditions must be accepted in writing by General Contractor, Turf Manufacturer and/or Turf Installation Company.

### 3.03 TURF REMOVAL AND DISPOSAL

- A. Cut existing turf in contractor determined widths so that turf and infill can be removed as a system. All work shall take place on the existing turf surface to avoid disturbances to existing aggregate.
- B. Remove existing turf from fields by rolling the cut turf up and lifted/carried off of the field, no dragging of turf rolls on any surface will be permitted.
- C. All material needs to be recycled or repurposed in a legal manner off site. Recycle certifications shall be presented upon request to assure proper material handling.

### 3.04 EXAMINATION

- A. The Contractor shall verify that all subbase, drainage, and leveling are completed prior to installation. The subbase shall be drag-boxed prior to Synthetic Turf Manufacturer's approval of the subbase.
- B. The finished grade of the aggregate base shall not vary more than 3/16 of an inch in ten (10) feet. A laser grader must be used to meet these requirements.
- C. Prior to the beginning of installation, the Installer of the Synthetic Turf shall inspect the subbase and accept in writing the subbase surface planarity and compaction. The Contractor shall have the field dimensions and locations for markings measured by a licensed Land Surveyor registered in the State of VA in order to verify conformity to the specifications and applicable standards. A record of the finished field as-built measurements shall be made and submitted to the Owner.

- D. The overall base design, vertical drainage system, and the gradations of the aggregate shall be approved in writing by the Synthetic Turf Manufacturer prior to Synthetic Turf installation.
- E. The surface must be perfectly clean as installation commences and shall be maintained in that condition throughout the process.
- F. Restoration of Damage: The Infilled Synthetic Turf Removal contractor and/or Installation contractor shall exercise care in the execution of his work and avoid damage or defacement of the existing aggregate base substrate and adjacent or surrounding areas by using suitable protective means. Damage or defacement that occurs shall be remedied to the satisfaction of the Owner.

### 3.05 SYNTHETIC TURF FABRIC INSTALLATION

- A. Compaction of the perimeter around the playing field is essential to maintain the integrity of the perimeter and the soil surrounding the voided area.
- B. The Synthetic Turf carpet shall be installed in accordance with Manufacturer's instructions. The Contractor shall adhere to the installation procedures outlined under this section. Any variance from these requirements must be accepted in writing, by the Owner, verifying that the changes do not in any way affect the warranty. Infill materials shall be approved by the Manufacturer and installed in accordance with the Manufacturer's standard procedures.
- C. The carpet rolls shall be installed directly over the properly prepared aggregate base. Extreme care shall be taken to avoid disturbing the aggregate base, both regarding compaction and planarity. The Contractor shall ensure that a 2 - 5 ton static roller is on-site and available to repair and properly compact any disturbed areas of the aggregate base.
- D. The full width rolls shall be laid out across the field. The Synthetic Turf shall be of sufficient length to permit full cross-field installation from sideline to sideline. No head or cross seams shall be allowed in the main playing area between the sidelines. Utilizing standard state-of-the-art sewing procedures, each roll shall be attached to the next at the five (5) yard line locations on the white line, no seams between yard lines shall be permitted. When all of the rolls of the playing surface have been installed, the sideline areas shall be installed at right angles to the playing field.
- E. The carpet shall be affixed to the continuous concrete curb using the Synthetic Turf Manufacturer's recommended adhesive as shown on the drawings.
- F. All primary seams must be sewn. Seams shall be flat, tight, and permanent with no separation or fraying. All primary seams must be sewn using double bagger stitches or polyester thread. Seams shall be flat, tight, and permanent with no separation or fraying. All inlays shall be glued with epoxy and seam tape. Hot melt glue is not allowed.

- G. Infill material shall be applied in numerous thin lifts. The turf shall be brushed as the mixture is applied.
- H. The sand and cryogenic rubber infill materials shall be installed in accordance with the Synthetic Turf Manufacturer's recommendations. The sand and cryogenic rubber infill materials shall be installed to a minimum depth of 1 7/8" inches +/-1/16" of an inch (47mm +/- 1mm) on a minimum pile height of 2 1/2" inches of Synthetic Turf fibers.
- I. The sand/cryogenic rubber infill materials shall be installed to fill the voids between the fibers and allow the fibers to remain vertical and non-directional.
- J. Synthetic turf shall be attached to the perimeter edge detail in accordance with the Manufacturer's standard procedures with continuous glue and mechanical fasteners at minimum 16"-inches on center.
- K. Installation shall not proceed when:
  - 1. Ambient air temperature is below forty (40°) degrees Fahrenheit (F).
  - 2. Material temperature is below forty (40°) degrees Fahrenheit (F).
  - 3. Rain is falling or pending, unless acceptable to qualified installers.
  - 4. Conditions exist, or are pending, that will be unsuitable for the installation of the system.

3.06 FIELD MARKINGS

- A. Inlaid and tufted lines and markings shall be per the drawings.
- B. Painted lines shall not be acceptable.
- C. Designated soccer and football fields will have the following lines inlaid according to FIFA and NCAA standards., and the National Federation of State High School Associations (NFHS) for soccer and football and as shown on the contract documents:
  - 1. Side lines
  - 2. End lines
  - 3. Center line
  - 4. Goal lines
  - 5. Penalty lines
  - 6. Media lines

- D. Designated soccer fields shall have the following markings inlaid in with a specific color:
1. Center circle (to be determined by the Owner)
  2. Goal mouth (to be determined by the Owner)
  3. Corner kick areas (to be determined by the Owner)

### 3.07 DELIVERABLES

- A. Prior to Final Acceptance, the Contractor shall submit to the Owner:
1. Three (3) copies of Maintenance Manuals, which shall include all necessary instructions for the proper care and preventive maintenance of the synthetic turf system, including painting and markings.
  2. Project Record Documents: Recording actual locations of seams, drains or other pertinent information including three (3) copies of the certified "as-built" drawings for all work performed on this project.
  3. Warranty: Manufacturer Warranty ensuring that applicable documented forms have been completed in Owner's name and registered with the Manufacturer. The Manufacturer shall have a representative on-site to certify the installation and Warranty compliance.
  4. Necessary testing data to the Owner that the finished field meets the required shock attenuation (GMax), as per ASTM F355/F1936 at turf installation. GMax to be  $\leq 120$  at installation and no greater than 165 for the life of the warranty.
  5. The synthetic turf supplier/installer shall submit at the pre-construction conference a certificate stating that it is not aware of any aspects of the proposed turf system to be installed which knowingly violate any patented materials or methods and that the manufacturer fully indemnifies the Owner and Design Engineer from any liability arising out of any issue related to patent infringement.
  6. Submit a certified statement issued by the synthetic field surfacing materials supplier/installer, attesting that all areas and surfaces designated to receive synthetic field surfacing have been inspected and found satisfactory for the reception of the Work covered under this Section; and are not in conflict with the "Guarantee" requirements. Installation of synthetic field surfacing materials may not commence until the Design Engineer has determined that the specifications of the aggregate base planarity and sideline drainage have been met.

### 3.08 CLEANING AND PROTECTION



- A. Protect installed Synthetic Turf from subsequent construction operations.
- B. Do not permit traffic over unprotected Synthetic Turf surface.
- C. Contractor shall provide the labor, supplies, and equipment as necessary for final cleaning of surfaces and installed items.
- D. All usable remnants of new material shall become the property of the Owner. These shall become the contractor's responsibility to dispose if not wanted by owner.
- E. The Contractor shall keep the area clean throughout the project and clear of debris.
- F. Surfaces, recesses, enclosures, etc., shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

END OF SECTION

## SECTION 02750

### SAND/RUBBER SYNTHETIC TURF FIELD SURFACE AND RELATED WORK SYNTHETIC TURF FIELD SYSTEM

#### PART 1 – GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and Division 1 Specifications Sections, apply to the Work of this Section, with special attention to the following:
  - 1. Shop Drawings, Product Data and Samples: Section 01340
  - 2. Project Record Information: Section 01720
  - 3. Operating and Maintenance Data: Section 01730
  - 4. Warranties and Bonds: Section 01740

##### 1.02 RELATED WORK

- A. Site Preparation: Section 02100
- B. Earthwork: Section 02200
- C. Base Construction and Related Work Synthetic Turf Field System: Section 02751

##### 1.03 DESCRIPTION

- A. Furnish all labor materials, materials, equipment and tools necessary to install a typical Sand/Rubber In-Fill Synthetic Turf System as indicated on the drawings and as specified herein. The installation of all new materials shall be performed in strict accordance with the Synthetic Turf Manufacturer's instructions and in accordance with all approved shop drawings. A Synthetic Turf System includes all earthwork, base construction and athletic field surface.

##### 1.04 QUALITY ASSURANCE

- A. Regulatory Requirements and references as listed below are the current guidelines set forth by the governing bodies listed. All work under this Section shall conform to the latest edition as applicable:
  - 1. American Society for Testing and Materials (ASTM)
  - 2. Consumer Product Safety Commission (CPSC)
  - 3. International Hockey Federation (FIH)

4. National Collegiate Athletic Association (NCAA)
  5. National Federation of State High School Association (NFHS)
  
  6. National Recreation and Park Association (NRPA)
  
  7. USA Field Hockey
  
  8. US Lacrosse Foundation
  
  9. United States Soccer
- B. The Contractor must employ competent workers skilled in the installation of Synthetic Turf as outlined in Section 1.05.
- C. The designated supervisory personnel on the project must be certified in writing by the Synthetic Turf Manufacturer as competent in the installation of this material, including sewing seams and proper installation of the infill mixture.
- D. The Contractor is responsible for reviewing and certifying that the proposed subgrade, drainage, and laser grading are completed in accordance with the contract documents prior to the installation of the Synthetic Turf, that the Synthetic Turf system being supplied and installed meets or exceeds the design criteria of the specifications, and that the site conditions exceed the minimum requirements of the system's design performance standards as set by the Synthetic Turf Manufacturer. Installation of synthetic field surface materials may not commence until the Engineer receives the final acceptance of finished crushed stone/aggregate base from the synthetic turf field manufacturer.
- E. The Contractor is required to use a licensed Land Surveyor registered in the State of VA for all layout and engineering work.
- F. In-fill materials will be tested by the Owner for conformance to the specification.

#### 1.05 EXPERIENCE

- A. Firm Experience:
1. The Synthetic Turf System shall be installed by an experienced Contractor who shall provide a list of twenty-five (25) completed field installations in the United States within the last three years performing business under the name of the current installation company, providing specific information about the name of the product, contact names, addresses, telephone numbers, year of the installation and type of infill material for the following type of fields:
    - A. A soccer field and a football field of 70,000 sq. ft. or larger.

- B. A list of synthetic turf fields, other than soccer or football.
  2. The list shall include a minimum of twenty-five (25) fields that have been approved for game play by one of the following associations:
    - A. National Collegiate Athletic Association-(NCAA)
    - B. National Federation of State High School Associations
    - C. Federation Internationale de Football Associations (FIFA)
    - D. National Recreation and Park Association (NRPA)
  3. The contractor performing the turf removal equipment shall have removed a minimum of 5 fields over the past two years.
  4. The Contractor may use Subcontractors/Installers who employ only qualified and experienced Supervisors and Technicians skilled in the installation of the Synthetic Turf.
  5. The contractor shall have a minimum of one (1) certified field builder on staff through American Sports Builders Association (ASBA).
- B. Principal Staff Experience:
  1. The Contractor shall detail the experience, educational background and training of the proposed principal staff, as follows:
    - A. Contract Manager- The Contract Manager shall be a current and qualified employee of the Contractor; be skilled in the performance of the assigned duties; and have a minimum of three years experience managing or supervising similar sized projects.
    - B. Supervisor- The supervisor shall be a current and qualified employee of the Contractor; be skilled in the performance of the assigned duties; have a minimum of eighteen months experience in supervising similar sized projects; and have installed In-Fill Synthetic Turf System products a minimum of twenty-five (25) installations.
    - C. The turf installation crew personnel qualifications shall include the individuals' resume, project list and contact information. Such information shall clearly identify the experience and qualifications in performing the type of work covered by these Specifications. All information provided shall include a description of the identified projects, and the name and telephone number of a responsible contact person who can verify the information provided.

- D. The Contractor shall not replace the named individuals for the duration of the contract unless the substitute individuals have equivalent qualifications as approved by the Owner.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in sealed unopened containers with manufacturer's labels intact.
- B. Store materials in protected area at a temperature not to exceed maximum and minimum temperatures as recommended by manufacturer. Protect products from UV degradation.

1.07 SUBMITTALS

- A. All submittals shall be directed to the Owner and Engineer electronically for distribution. The contractor may only send paper submittals where applicable.
- B. One sample of Synthetic Turf, a minimum of 12 x 12 inches in size, illustrating details of the finished product.
- C. One sample of Shock Pad, a minimum of 12 x12 inches in size, illustrating details of the finished product. (If Alternate Selected)
- D. A letter and specifications sheet certifying that the products of this specification Section meet or exceed specified requirements.
- E. Submit Certified copies of independent (third-party) laboratory reports on ASTM tests as follows for Synthetic Turf carpet:
  - 1. Specific Gravity and Density of Plastics by Displacement, ASTM D792
  - 2. Tuft Bind without Infill, ASTM D1335
  - 3. Melt Point Index, American Association of Textile Chemists and Colorists #20 (AATCC #20)
  - 4. Total Product Weight without Infill, ASTM D5848
  - 5. Average Pile Yarn Weight, ASTM D5848
  - 6. Average Tuft Height, ASTM D5823
  - 7. Grab Tear Strength, ASTM D5034
  - 8. Breaking Strength of Textile Fabrics (Length) – Glued or Sewn Seam Turf Sample, ASTM D5034

9. Pile Height, Face Width & Total Fabric Weight, ASTM D5848
  10. Methanamine Pill Test ASTM D2859
  11. Impact Attenuation, GMax, ASTM F355/F1936
  12. Coefficient of Friction, ASTM F1551
  13. Water Permeability with Infill, ASTM D4491
  14. Abrasiveness, ASTM F1015
  15. Primary Backing Weight, ASTM D5848
  16. Secondary Backing Weight, ASTM D5848
  17. Machine Gauge, ASTM D5793
  18. Yarn Denier, ASTM D1577
  19. Fiber Thickness, ASTM D5034
  20. Average Fiber Break Strength and Elongation, ASTM D2256
  21. Accessibility of Surface, ASTM F1951
  22. Heavy Metal Content for all metals in fiber and infill, ASTM F2765-09
- F. One copy of the Synthetic Turf Manufacturer's insured non-prorated warranty and Insurance policy information.
- G. Shop drawings indicating:
1. A Field Layout with tufted/inlaid lines
  2. Field Marking Plan and details for all fields shown.
  3. Roll/Seaming Layout.
  4. Methods of Attachment, Field Openings and Perimeter Conditions
  5. Synthetic Turf Manufacturer's technical product data literature
  6. Sewing/Adhesives technical specification
  7. Sieve Analysis of Sand and Cryogenic Rubber In-Fill
  8. Sample of Cryogenic Rubber and Sand from actual source supplier

9. Base and Finish Aggregate Stone source and material specification/certification
  10. Drainage Piping specifications
  11. Concrete Curb Edging details
  12. Concrete Mix design
  13. Asphalt Mix design
  14. Seed Mix and sod supplier
  15. Specifications for soccer goal posts, backstays, and ground sleeves
  16. Synthetic Turf Field maintenance equipment specifications and cut sheets
  17. Material Safety Data Sheet (MSDS) for rubber infill, turf backing system, and glue (if applicable)
  18. Method of attachment, field openings and perimeter conditions
- H. The Contractor shall submit a statement of the origin, composition, and manufacturer of all materials to be used in the work, including optional or alternate items.
- I. The Synthetic Turf Manufacturer's name, type and composition of fiber.
- J. Sieve analysis of the infill rubber and sand with a certification that the drainage rates comply with the Synthetic Turf Manufacturer's requirements.

#### 1.08 WARRANTY

- A. The Synthetic Turf Manufacturer shall provide a Warranty to the Owner that covers defects in materials and workmanship of the Synthetic Turf for a minimum period of eight (8) years from the date of Substantial Completion. The Synthetic Turf Manufacturer must verify that their on-site Representative has inspected the installation and that the work conforms to the Synthetic Turf Manufacturer's requirements.
- B. The Synthetic Turf Manufacturer shall provide a Warranty to the Owner that covers defects in materials and workmanship of the Synthetic Turf for a period of eight (8) years from the date of Substantial Completion. The Synthetic Turf Manufacturer shall include coverage for damage caused from UV degradation or defects in workmanship and materials in the manufacturing or installation of the Synthetic Turf. All Synthetic Turf warranties shall include repair or replacement of the affected

areas and include all necessary materials, labor, transportation costs, etc. to complete the required repairs.

- C. The synthetic turf system shall drain vertically a minimum of 14 inches per hour without prolonged accumulation of surface water. If the synthetic turf system does not drain in accordance with this Specification, then punching the carpet backing or any method creating additional holes in the backing other than the designed drainage holes will not be permitted. The removal and replacement of the infill will be permitted given there is not damage to the fibers in the process.
- D. The Synthetic Turf Manufacturer's Warranty must be supported by a pre-paid insured warranty policy. A copy of the policy must be provided with the Bid Submittal and include the following information and features:
1. Name of the carrier
  2. Method for payment of the policy (must be pre-paid and non-cancelable).
  3. Insured warranty shall be provided by a third-party insurer with an A.M. Best financial strength rating of A- or better.
  4. The policy shall not be a re-insurance or off-shore policy or a letter of credit.
  5. Insured warranty coverage shall be for the full 100% replacement value of the total square footage installed.
  6. Insured warranty coverage shall apply to the full 8-year period from substantial completion date of project with no uninsured periods or periods of self-insurance.
  7. The insured warranty policy must have a zero deductible.
  8. Insured warranty policy coverage shall specifically provide for reimbursement to the warranty holder (i.e. the Participating Public Agency) in the event of a bankruptcy of the synthetic turf provider.
  9. Insured warranty coverage shall apply to playing surface inclusive of infill, seaming, labor and colored inlays for event markings.
  10. Insured warranty coverage shall not have exclusions for epidemic or catastrophic failure.
  11. Insured warranty coverage shall not limit the hours of use.
  12. Insured warranty coverage shall not exclude heavily trafficked areas or related uses such as team or band practices.



13. Insured warranty coverage shall not exclude any colored turf fibers.
  14. Insured warranty coverage shall offer a minimum claim limit of Five Million Dollars (\$5,000,000) in the aggregate per annum.
  15. Insured warranty coverage shall offer a minimum claim limit of Five Hundred Thousand Dollars (\$500,000) per field.
  16. Additional insured warranty policy features of importance.
- E. The contractor shall provide one Gmax test at completion and one Gmax test at the one year warranty anniversary.

## PART 2 – PRODUCTS

### 2.01 MATERIALS

- A. The only approved Synthetic Turf products identified for the purpose of this bidding solicitation are:
1. Field Turf                      2.5" – 13,000 Denier (Slit Film)
  2. AstroTurf                      2.5" – 13,000 Denier (Slit Film)
  3. A-Turf                          2.5" – 13,000 Denier (Slit Film)
  4. Shaw Sports Turf              2.5" – 13,000 Denier (Slit Film)
  5. Hellas Sports                  2.5" – 13,000 Denier (Slit Film)  
Construction
  6. Sprinturf                        2.5" – 13,000 Denier (Slit Film)

Selection of these products represents the required minimum performance criteria as outlined herein. The manufacturer's performance criteria and product properties and declarations both physical and chemical are as represented by the manufacturers at the time of this solicitation. Approved equals must be pre-bid approved.

- B. The Synthetic Turf material and resilient cryogenic rubber/sand infill shall be in accordance with the following:
1. The Slit Film fiber shall be tufted with (2) end per needle to achieve 13,000 minimum denier with one (1) fiber less than 8000 denier and 100 micron thickness 100% polyethylene, low friction fiber, measuring not less than 2.50"-inches high, product as manufactured by, Controlled Products, Shaw,

Bonar Yarns & Fabrics. TTC/Polyloom, Ten Cate Thiolon, or equal. The low friction fiber shall be specifically designed to minimize abrasion.

2. The tufted fiber weight shall not be less than 54 ounces per square yard for manufacturers using a sand/cryogenic rubber infill mix. The fiber shall be tufted on a 3/8 inch to a 1/2 inch gauge at a stitch rate determined by manufacture in order to achieve specified face weight. The overall product weight must not be less than 60 ounces per square yard. The low friction non-abrasive fiber shall be 100% polyethylene, treated with a UV inhibitor. Systems that use polyethylene/polypropylene blended fibers and systems that include any type of nylon fibers are unacceptable.
3. The primary backing shall consist of a backing with a minimum weight of 7 ounces per square yard. The secondary backing shall consist of an application of polyurethane or urethan (minimum of 18 ounces per square yard) heat activated to permanently lock fiber tufts in place. Products using latex based secondary backings will not be acceptable. The Synthetic Turf system shall be perforated with a minimum of 1/8" inch diameter holes every 3/16" of an inch at 14" per hour.

A summary of the required properties for the installed Synthetic Turf properties are as follows:

| <u>Testing Standards</u> |                     | <u>Specifications</u>                    | <u>Properties</u>   |
|--------------------------|---------------------|--|---|
| A.                       | ASTM D1577          | Fiber Denier(A)<br>Fiber Denier(B)       | 8,000 (min) – Slit Film<br>5,000 (min)- Slit Film           |
| B.                       | ASTM D3218          | Fiber Thickness                          | 100 microns (min) – Slit Film                               |
| C.                       | ASTM D5823          | Pile Height                              | 2.5" inches nominal (minimum)                               |
| D.                       | ASTM D5848          | Pile Weight                              | 54 oz. /sq. yd. (minimum)                                   |
| E.                       | ASTM D1335          | Tuft Bind without Infill                 | 8 lbs./force (minimum)                                      |
| F.                       | ASTM D5848          | Primary Backing                          | 7 oz./sq. yd. (minimum)                                     |
| G.                       | ASTM D5848          | Secondary Backing                        | 18 oz./sq. yd. (minimum)                                    |
| H.                       | ASTM D5848          | Total Product Weight<br>(without Infill) | 60 oz./sq. yd. (minimum)                                    |
| I.                       | ASTM D5793          | Machine Gauge                            | 3/8 inch to 1/2 inch  |
| J.                       | ASTM D5034          | Grab Tear (width)                        | 200 lbs./force (minimum)                                    |
| K.                       | ASTM D5034          | Grab Tear (length)                       | 200 lbs./force (minimum)                                    |
| L.                       | ASTM F1015          | Relative Abrasiveness<br>Index           | Ranges between 14 and 22                                    |
| M.                       | ASTM F2765          | Total Lead Content                       | Less than 50 ppm  |
| N.                       | ASTM D4491          | Water Permeability                       | >=14 inches/hour (minimum)                                  |
| O.                       | ASTM D2859          | Flammability (Pill Burn)                 | Pass  |
| P.                       | ASTM F355/<br>F1936 | Impact Attenuation                       | =<120 at installation (GMax)<br>=<165 over life of warranty |
| Q.                       | ASTM F1951          | Accessibility of Surface                 | Present Test Findings                                       |
| R.                       | ASTM F2765          | Heavy Metal Testing                      | **Present Test Findings                                     |

SAND/RUBBER SYNTHETIC TURF FIELD SURFACE  
 AND RELATED WORK  
 SYNTHETIC TURF FIELD SYSTEM

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- S. Headspace GC/MS VOC Testing                   \*\*Present Test Findings
- T. Solvent extraction GC/MS - PAH Testing       \*\*Present Test Findings

\*\* Test findings shall comply with EPA soil and drinking water standards.

- 4. The carpet shall be delivered in 15' wide rolls. The rolls shall be of sufficient length to go from sideline to sideline of the soccer field. Head seams between the sidelines of the football field will not be acceptable.
- C. All field lines, numbers and markings indicated on the drawings shall be permanently inlaid.
- D. The fiber shall be green in color to simulate natural grass as closely as possible, treated with UV inhibitor, and guaranteed for a minimum of eight years.
- E. Infill Material: The infill system shall be graded, cryogenically hammer-milled SBR rubber. The rubber shall be free of all dust, toxic materials and metals. The proposed cryogenic rubber and sand infill shall be clean material and shall be tested for compliance. The sand shall be select and graded dust-free silica sand. Depth of material at completion of placement shall be 1 7/8" inches (± 1/16 inches) and as required to reach the required initial and subsequent Gmax ratings. Samples of both the cryogenic rubber and sand shall be submitted to the Owner for approval prior to installation.

Silica sand within the infill mix, 35% to 50% by weight, will meet the following size distribution:

| U.S. Mesh | Metric (mm) | % Retained per sieve |
|-----------|-------------|----------------------|
| 16        | 1.190       | 0                    |
| 20        | 08.840      | 0-3                  |
| 25        | 0.710       | 10-30                |
| 30        | 0.590       | 30                   |
| 35        | 0.500       | 15-35                |
| 40        | 0.420       | 5-15                 |
| 50        | 0.297       | <5                   |
| 70        | 0.210       | Trace                |

Sand will consist of uniform, sub-angular to rounded, single grains. **It will be dust-free**, and un-ground. Crusher fines are unacceptable.

Cryogenic rubber shall be governed by the following specifications:

Size Specifications for Cryogenically Ground 10-20 Rubber

$$1.60\text{mm} < D_{50} < 1.75\text{mm}$$

$$1.10 < D_{60}/D_{10} < 1.40$$

$$0.80 < \frac{D_{30}^2}{D_{10} D_{60}} < 1.20$$

Where Dx represents the grain size for which x% of the rubber is smaller. i.e., if  $D_{50} = 0.7\text{mm}$ , this means that 50% of grains (by weight) are smaller than 0.7mm. The shape of the rubber particles shall be granular (edges shall not be stringy). As an approximation, the following ranges of values for the sieve analysis are acceptable:

| MILLMTR | MICRONS | US MESH | % RETAINED |
|---------|---------|---------|------------|
| 2.38    | 2380    | 8       | 0-3%       |
| 2.00    | 2000    | 10      | 0-15%      |
| 1.68    | 1680    | 12      | 10-30%     |
| 1.41    | 1410    | 14      | 20-40%     |
| 1.19    | 1190    | 16      | 10-30%     |
| 0.841   | 841     | 20      | 15-30%     |
| 0.595   | 595     | 30      | 0-5%       |

- F. The exposed fiber height above the infill material shall be approximately 5/8" of an inch +/-1/16" of an inch. The entire Synthetic Turf system shall be resistant to bacterial and fungal growths.
- G. Surplus Materials: The Contractor shall provide the Owner, at each installation as a part of the Contract, the following surplus materials transported to storage location selected by the Owner:
  - 1. Synthetic Turf Fabric (green) – 500 square feet with at least one piece fifteen (15) feet by thirty (30) feet.
  - 2. Synthetic Turf Fabric (White, Yellow, Blue, Orange, Red or any other colors)- 50 linear feet each.
  - 3. Infill Material – as required to infill 500 square feet. This material shall not be used by the Synthetic Turf Subcontractor to maintain depth and GMax values during the warranty period. The Contractor must provide material, matching the existing infill material, during the warranty period at no cost to the Owner.

## 2.02 EQUIPMENT

- A. Refer to plan details and specification section 02752 for athletic accessories including permanent and/or portable goals.

### **PART 3 - EXECUTION**

#### **3.01 GENERAL**

- A. The installation of the Synthetic Turf System shall be performed in full compliance with approved Shop Drawings.
- B. All designs, markings, layouts, and materials shall conform to all applicable and current FIFA, NCAA or National State High School Federation rules and other standards that may apply to this type of Synthetic Turf installation.
- C. Only trained technicians, skilled in the removal and installation of athletic caliber synthetic turf systems working under the direct supervision of the approved installer supervisors, shall undertake any cutting, sewing, gluing, shearing, topdressing or brushing operations.
- D. The designated Supervisory personnel on the project must be certified, in writing by the turf Manufacturer, as competent in the installation of this material, including sewing seams and proper installation of the Infill mixture.

#### **3.02 EXAMINATION**

- A. The Contractor shall verify that all subbase, drainage, and leveling are completed prior to installation. The subbase shall be drag-boxed prior to Synthetic Turf Manufacturer's approval of the subbase.
- B. The finished grade of the aggregate base shall not vary more than 3/16 of an inch in ten (10) feet. A laser grader must be used to meet these requirements.
- C. Prior to the beginning of installation, the Installer of the Synthetic Turf shall inspect the subbase and accept in writing the subbase surface planarity and compaction. The Contractor shall have the field dimensions and locations for markings measured by a licensed Land Surveyor registered in the State of VA in order to verify conformity to the specifications and applicable standards. A record of the finished field as-built measurements shall be made and submitted to the Owner.
- D. The overall base design, vertical drainage system, and the gradations of the aggregate shall be approved in writing by the Synthetic Turf Manufacturer prior to Synthetic Turf installation.
- E. The surface must be perfectly clean as installation commences and shall be maintained in that condition throughout the process.
- F. Restoration of Damage: The Infilled Synthetic Turf Removal contractor and/or Installation contractor shall exercise care in the execution of his work and avoid

damage or defacement of the existing aggregate base substrate and adjacent or surrounding areas by using suitable protective means. Damage or defacement that occurs shall be remedied to the satisfaction of the Owner.

### 3.03 SYNTHETIC TURF FABRIC INSTALLATION

- A. Compaction of the perimeter around the playing field is essential to maintain the integrity of the perimeter and the soil surrounding the voided area.
- B. The Synthetic Turf carpet shall be installed in accordance with Manufacturer's instructions. The Contractor shall adhere to the installation procedures outlined under this section. Any variance from these requirements must be accepted in writing, by the Owner, verifying that the changes do not in any way affect the warranty. Infill materials shall be approved by the Manufacturer and installed in accordance with the Manufacturer's standard procedures.
- C. The carpet rolls shall be installed directly over the properly prepared aggregate base. Extreme care shall be taken to avoid disturbing the aggregate base, both regarding compaction and planarity. The Contractor shall ensure that a 2 - 5 ton static roller is on-site and available to repair and properly compact any disturbed areas of the aggregate base.
- D. The full width rolls shall be laid out across the field. The Synthetic Turf shall be of sufficient length to permit full cross-field installation from sideline to sideline. No head or cross seams shall be allowed in the main playing area between the sidelines. Utilizing standard state-of-the-art sewing procedures, each roll shall be attached to the next at the five (5) yard line locations on the white line, no seams between yard lines shall be permitted. When all of the rolls of the playing surface have been installed, the sideline areas shall be installed at right angles to the playing field.
- E. The carpet shall be affixed to the continuous concrete curb using the Synthetic Turf Manufacturer's recommended adhesive as shown on the drawings.
- F. All primary seams must be sewn. Seams shall be flat, tight, and permanent with no separation or fraying. All primary seams must be sewn using double bagger stitches or polyester thread. Seams shall be flat, tight, and permanent with no separation or fraying. All inlays shall be glued with epoxy and seam tape. Hot melt glue is not allowed.
- G. Infill material shall be applied in numerous thin lifts. The turf shall be brushed as the mixture is applied.
- H. The sand and cryogenic rubber infill materials shall be installed in accordance with the Synthetic Turf Manufacturer's recommendations. The sand and cryogenic rubber infill materials shall be installed to a minimum depth of 1 7/8" inches +/- 1/16" of an inch (47mm +/- 1mm) on a minimum pile height of 2 1/2" inches of Synthetic Turf fibers.

- I. The sand/cryogenic rubber infill materials shall be installed to fill the voids between the fibers and allow the fibers to remain vertical and non-directional.
- J. Synthetic turf shall be attached to the perimeter edge detail in accordance with the Manufacturer's standard procedures with continuous glue and mechanical fasteners at minimum 16"-inches on center.
- K. Installation shall not proceed when:
  - 1. Ambient air temperature is below forty (40°) degrees Fahrenheit (F).
  - 2. Material temperature is below forty (40°) degrees Fahrenheit (F).
  - 3. Rain is falling or pending, unless acceptable to qualified installers.
  - 4. Conditions exist, or are pending, that will be unsuitable for the installation of the system.

#### 3.04 FIELD MARKINGS

- A. Inlaid and tufted lines and markings shall be per the drawings.
- B. Painted lines shall not be acceptable.
- C. Designated soccer and football fields will have the following lines inlaid according to FIFA and NCAA standards., and the National Federation of State High School Associations (NFHS) for soccer and football and as shown on the contract documents:
  - 1. Side lines
  - 2. End lines
  - 3. Center line
  - 4. Goal lines
  - 5. Penalty lines
  - 6. Media lines
- D. Designated soccer fields shall have the following markings inlaid in with a specific color:
  - 1. Center circle (to be determined by the Owner)
  - 2. Goal mouth (to be determined by the Owner)
  - 3. Corner kick areas (to be determined by the Owner)

### 3.05 DELIVERABLES

- A. Prior to Final Acceptance, the Contractor shall submit to the Owner:
1. Three (3) copies of Maintenance Manuals, which shall include all necessary instructions for the proper care and preventive maintenance of the synthetic turf system, including painting and markings.
  2. Project Record Documents: Recording actual locations of seams, drains or other pertinent information including three (3) copies of the certified "as-built" drawings for all work performed on this project.
  3. Warranty: Manufacturer Warranty ensuring that applicable documented forms have been completed in Owner's name and registered with the Manufacturer. The Manufacturer shall have a representative on-site to certify the installation and Warranty compliance.
  4. Necessary testing data to the Owner that the finished field meets the required shock attenuation (GMax), as per ASTM F355/F1936 at turf installation. GMax to be  $\leq 120$  at installation and no greater than 165 for the life of the warranty.
  5. The synthetic turf supplier/installer shall submit at the pre-construction conference a certificate stating that it is not aware of any aspects of the proposed turf system to be installed which knowingly violate any patented materials or methods and that the manufacturer fully indemnifies the Owner and Design Engineer from any liability arising out of any issue related to patent infringement.
  6. Submit a certified statement issued by the synthetic field surfacing materials supplier/installer, attesting that all areas and surfaces designated to receive synthetic field surfacing have been inspected and found satisfactory for the reception of the Work covered under this Section; and are not in conflict with the "Guarantee" requirements. Installation of synthetic field surfacing materials may not commence until the Design Engineer has determined that the specifications of the aggregate base planarity and sideline drainage have been met.

### 3.06 CLEANING AND PROTECTION

- A. Protect installed Synthetic Turf from subsequent construction operations.
- B. Do not permit traffic over unprotected Synthetic Turf surface.
- C. Contractor shall provide the labor, supplies, and equipment as necessary for final cleaning of surfaces and installed items.



SAND/RUBBER SYNTHETIC TURF FIELD SURFACE  
AND RELATED WORK  
SYNTHETIC TURF FIELD SYSTEM

SECTION 02750

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- D. All usable remnants of new material shall become the property of the Owner. These shall become the contractor's responsibility to dispose if not wanted by owner.
- E. The Contractor shall keep the area clean throughout the project and clear of debris.
- F. Surfaces, recesses, enclosures, etc., shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

END OF SECTION

## SECTION 02751

### BASE CONSTRUCTION AND RELATED WORK SYNTHETIC TURF FIELD SYSTEM

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions, Supplementary Conditions and Division 1 through Division 3 Specification Sections, apply to the Work of this Section.

##### 1.02 RELATED WORK

- A. Section 02100: Site Preparation
- B. Section 02200: Earthwork
- C. Section 02750: Sand/Rubber Synthetic Turf Field Surface and Related Work  
Synthetic Turf Field System
- D. Section 02810: Field Irrigation System
- E. Section 03200: Concrete Reinforcement
- F. Section 03300: Cast-In-Place Concrete

##### 1.03 DESCRIPTION OF WORK

- A. Furnish all labor, materials, equipment and tools necessary to install a typical Synthetic Turf Field System as indicated on the drawings and as specified herein. The installation of all new materials shall be performed in strict accordance with the specification, Synthetic Turf Manufacturer's instructions and in accordance with all approved shop drawings. A Synthetic Turf Field System includes all earthwork, base construction, and athletic field surfaces as follows:
  - 1. All engineering and layout work.
  - 2. Pouring in-place concrete around the perimeter edge as detailed on the drawings. Attachment of the synthetic turf to the concrete perimeter edge shall be accomplished per the contract documents.
  - 3. Trenching for all subsurface drainage systems including installation of geotextile filter fabric.
  - 4. Installation of horizontal pipes, collector pipes, and outfall pipes per contract documents.

5. Backfilling pipe drainage system per contract documents.
6. Installation of goal post foundations, sleeves, and goal posts and net systems.
7. Installation of stone drainage base system per contract documents.
8. Installation of communication boxes, irrigation quick coupler within accessible boxes and clean outs within accessible boxes.
9. Survey verification of stone drainage base elevation tolerances by the Owner's Engineer to check for conformance. Base as-built elevations to be submitted to Owner.

#### 1.04 QUALITY ASSURANCE

- A. Standards: Install Synthetic Turf System complying with Synthetic Turf Manufacturer's requirements and the plans and specifications.
- B. The Contractor, prior to installation of the Synthetic Turf, shall inspect the sub-base for conformance with the drawings and verify that the sub-base meets or exceeds the requirements of the Turf Installer. The Contractor shall be responsible for compaction testing of the sub-grade and sub-base to ensure compliance with the specifications and drawings. The Contractor shall survey the sub-grade and the sub-base to verify conformance with the approved drawings. The Contractor shall be responsible for correcting grades, elevations and planarity to conform to the drawings prior to installing the Synthetic Turf.
- C. The Contractor shall provide the necessary written certification that the aggregate base has been tested and meets the standards for infiltration, compaction and planarity. Written certification shall also be provided from turf manufacturer accepting the aggregate surface prior to placing artificial turf.
- D. Acceptance of the subgrade by the Owner will be based on the compaction testing and as-built survey verification provided by the contractor meeting compliance with design grade elevations for all disturbed areas within the field and outside of the field area. No aggregate, sod or finish materials shall be installed without the authorization from the owner/engineer that all grades have been properly established in accordance with the contract documents.

#### 1.05 EXPERIENCE

- A. Firm Experience:
  1. The Synthetic Turf aggregate base system shall be installed by an experienced Contractor who shall provide a list of five (5) completed field installations in the United States within the last five years, providing specific information about the name of the project, contact names, addresses,

telephone numbers, year of the installation and type of turf material for the following type of fields:

- a. A soccer field and a football field of 70,000 sq. ft. or larger.
  - b. A list of synthetic turf fields, other than soccer or football.
2. The list shall include a minimum of five (5) fields that have been approved for game play by one of the following associations.
    - a. National Collegiate Athletic Association – (NCAA)
    - b. National Federation of State High School Associations (NFHS)
    - c. Fédération Internationale de Football Associations (FIFA)
    - d. National Recreation and Park Association (NRPA)
  3. The Contractor may use Subcontractors/Installers who employ only qualified and experienced Supervisors and Technicians skilled in the installation of the Synthetic Turf.
  4. The Subcontractor/Installer must demonstrate its past experience on at least five (5) acceptable preparations of the sub-base for the installation of Synthetic Turf system for full-size football, soccer or other athletic/recreational fields (minimum of 70,000 square feet) in the United States within the past five years. A completed list of all installations of vertically draining porous stone base and drainage systems, contact names, and phone numbers shall be submitted to the Owner for review to demonstrate the Subcontractor's/Installer's qualifications.
- B. Principal Staff Experience:
1. The Contractor shall detail the experience, educational background and training of proposed principal staff, as follows:
    - A. Contract Manager – The Contract Manager shall be a current and qualified employee of the Contractor; be skilled in the performance of the assigned duties; have a minimum of three years' experience managing or supervising similar size projects; and have installed the proposed product at least five (5) installations.
    - B. On Site Supervisor – The Supervisor shall be a current and qualified employee of the Contractor; be skilled in the performance of the assigned duties; have a minimum of eighteen months experience in supervising similar size projects; and have installed the proposed product at a minimum of three (3) installations.

- C. The turf installation crew personnel qualifications shall include the individual's resume, project list and contact information. Such information shall clearly identify the experience and qualifications in performing the type of work covered by these specifications. All information provided shall include a description of the identified projects, and the name and telephone number of a responsible contact person who can verify the information provided.
- D. The Contractor shall not replace the named individuals for the duration of the contract unless the substitute individuals have equivalent qualifications as approved by the Owner.

1.06. DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials, in sealed unopened containers with manufacturer's labels intact.
- B. Store materials in protected area at a temperature not to exceed maximum and minimum temperatures as recommended by manufacturer. Protect products from UV degradation.

1.07 SUBMITTALS

- A. The Contractor shall submit the following information for approval prior to the start of base construction.
  - 1. A statement of the origin, composition, and manufacturer of all aggregate materials to be used in the work, including testing information supporting that the proposed aggregates meet or exceed the technical specifications.
  - 2. Supplier's material certifications for aggregate.
  - 3. Supplier's material certification for concrete.
  - 4. Product data sheets on all drainage pipe geotextile fabrics and fittings.
  - 5. Goal posts product data and shop drawings.
  - 6. Communication boxes, Irrigation boxes and Clean out boxes.
  - 7. Fences and Gates, fence pole foundation details.

**PART 2 - PRODUCTS**

2.01 MATERIALS

- A. Concrete for field perimeter curb shall be VDOT A4 4000 PSI or a minimum strength of 4000 PSI.

- B. Geotextile Fabric shall be Mirafi 140N or approved equal, unless specified otherwise on plans.
- C. Drainage Pipe shall be HDPE highway grade ADS N-12, unless specified otherwise on plans. Flat panels to be manufactured by American Drainage Systems and consist of polymeric core surrounded by geotextile.
- D. The base aggregate shall consist of a minimum of six (6) inches of VDOT #57 coarse aggregate (open graded) type material or of a base stone material meeting the gradation specifications shown in the table below. The base aggregate must be an open graded aggregate material and free draining, consistent with the vertical draining requirements of the Synthetic Turf Manufacturer.

BASE STONE GRADATION SPECIFICATIONS  
 %PASSING AND %RETAINED

| <u>Sieves</u>   | <u>Base Stone % Passing</u> | <u>Base Stone % Retained</u> |
|-----------------|-----------------------------|------------------------------|
| 1½" or 38.1mm   | 100                         | 0                            |
| 1" or 25.4mm    | 95-100                      | 0-5                          |
| ¾" or 19mm      | Optional                    | Optional                     |
| ½" or 12.7mm    | 25-60                       | 40-75                        |
| 3/8" or 9.51mm  | Optional                    | Optional                     |
| US #4 or 4.76mm | 0-10                        | 90-100                       |
| US #8 or 2.38mm | 0-5                         | 95-100                       |

- A. The secondary aggregate shall comprise, not to exceed two (2) inches, of VDOT #8 coarse aggregate (open graded) type material or of a secondary stone material meeting the gradation specifications as displayed in the table below. VDOT #8 coarse aggregate or the secondary stone material meeting the gradation specifications shall be transitioned in with the base aggregate and vibrated and rolled to provide a compacted sub-base.

SECONDARY STONE GRADATION SPECIFICATIONS  
 %PASSING AND %RETAINED

| <u>Sieves</u>    | <u>Secondary Stone % Passing</u> | <u>Secondary Stone % Retained</u> |
|------------------|----------------------------------|-----------------------------------|
| ½" or 12.7mm     | 100                              | 0                                 |
| 3/8" or 9.51mm   | 75-100                           | 0-25                              |
| US #4 or 4.76mm  | 5-30                             | 70-95                             |
| US #8 or 2.38mm  | 0-5                              | 95-100                            |
| US #16 or 1.19mm | 0                                | 100                               |

- F. The compacted sub-base of base aggregate and secondary aggregate shall be top-dressed with **not to exceed one (1) inch of porous, free draining material**, washed screenings that will provide a 90% minimum overall compaction of the finished aggregate base. The finishing aggregate shall meet the gradation specifications as shown in the table below.

TOP FINISH GRADATION SPECIFICATIONS  
 %PASSING AND %RETAINED

| <u>Sieves</u>         | <u>2" Top Finish<br/>% Passing</u> | <u>2" Top Finish<br/>% Retained</u> |
|-----------------------|------------------------------------|-------------------------------------|
| ½" or 12.5mm          | 100                                | 0                                   |
| 3/8" or 9.51mm        | 95-100                             | 0-5                                 |
| US#4 or 4.76mm        | 70-85                              | 15-30                               |
| US#8 or 2.38 mm       | 45-60                              | 40-55                               |
| US#16 or 1.19mm       | 25-40                              | 60-75                               |
| US#40 or<br>0.400 mm  | 2-12                               | 88-98                               |
| US#200 or<br>0.074 mm | 0-2                                | 98-100                              |

To ensure proper drainage: Permeability of complete aggregate system >20in/hr

Porosity of both stones > 25%

G. GOALS

1. The Contractor is responsible for providing and installing the stadium football goal post system comprising of two (2) Gooseneck Goal Posts (Sportsfield Specialties Model No. GPKR30HS 'Goal Pak' with access frame and turf cover SG2SGP), attachment hardware, reinforcement, access frame and turf covers over footings. Turf covers shall be removable in-order to access the base of the goal posts. Gooseneck length shall be field verified to match existing goal posts. The Goal Pak system shall include (2) two portable soccer goals per Model No. SG824R Round Faced Soccer Goal with SGMKR Integrated SGMobile Wheel Kit.
2. The Contractor is responsible for providing and installing the fields Combination "H" style goal post system comprising of two (2) Goal Posts and soccer goal net systems (Sports Field Specialties Model No. GP4900 with netting system GP4900-HD).

### **PART 3 - EXECUTION**

#### **3.01 MATERIAL TESTING**

Testing During Construction: To ensure that the quality of drainage stone materials remain constant from point of supply to jobsite, the following protocol shall be used by the Contractor:

1. Contractor shall submit a gallon supply of each base stone, secondary stone and finishing aggregate stone that meet the aforementioned properties for testing to ensure compliance by the Owner's testing agency prior to stone placement.
2. If anytime during the installation of the base stone, the secondary stone, and the finish aggregate stone the Contractor or owner observes a change in material and/or quality based on a visual inspection, then the Contractor must stop all operations immediately and contact the Owner/Engineer in order to perform additional testing on the materials in question. Failure to do so is the sole responsibility of the Contractor. The Owner will not be held accountable for any liability if the Contractor does not contact the Owner.
3. Before commencing the placement of synthetic turf on the stone drainage base, Contractor shall perform a conformance survey by a Licensed Surveyor registered in the State, on a 30-foot grid over the finished stone of the entire playing field for the Owner's approval. Additional layers of the base may be required to be as-built if indicated on the construction drawings.
4. Prior to commencing the base aggregate, confirm that the geotextile has been installed satisfactorily.
5. Protect the geotextile work as installation of the stone base is commenced.
6. Do not operate machinery directly over the geotextile fabric. Delivery trucks shall enter the field only from the designated entrance point. Stone shall be dumped at the entrance first and spread toward the furthest point of the field. Extreme care must be taken not to disturb the geotextile or subgrade surfaces. Ensure a minimum depth of 4" of aggregate between the geotextile fabric and equipment.
7. The Owner will have an independent testing agent conduct a field infiltration testing per The Standard Test Method for Infiltration Rate of Soils in Field Using Test Method BSI 7044 Method#4 or another equivalent percolation test to affirm the stone drainage base water permeability rate exceeds twenty (20) inches per hour. Testing will be a minimum of four (4) tests, one (1) per quadrant of field.



3.02 EXAMINATION

- A. Finished stone elevations shall be verified using laser survey. Finished grade must be within 3/16" of an inch from the elevations shown on the plans. The finished grade of the stone drainage base shall not vary more than 3/16 of an inch in ten feet. A laser grader must be used to verifiably meet these requirements.
- B. The surface to receive the Synthetic Turf shall be inspected by the Contractor, and reviewed with the Owner. The surface must be perfectly clean as installation commences and shall be maintained in that condition throughout the process.

3.03 GEOTEXTILE INSTALLATION

- A. Place geotextile promptly according to manufacturer's written instructions. Broom or roll geotextile smooth and free of wrinkles and folds. Overlap longitudinal joints 24 inches and transverse joints 24 inches.
- B. Protect geotextile from traffic and other damage and place aggregate the same day. Only place as much geotextile as can be covered with aggregate in the same working day.

3.04 SUBGRADE PREPARATION

- A. The subgrade must be sloped as specified on drawings but not less than a minimum slope of 0.5% for consistent base thickness, from the longitudinal center of the field towards the sidelines.
- B. The subgrade must be compacted in both directions to attain the specified compaction rate, which is 95% of standard Proctor at a moisture content within 2% of optimum in accordance with ASTM D1557. Subgrade shall also be proof rolled to check entire field for inadequate compaction requiring correction.
- C. The subgrade must be prepared to tolerances of not more than 1/2" from design grade to allow for even drainage. Subgrade shall be inspected with owner's representative prior to covering with geotextile. Contractor to provide written acceptance of subgrade prior to geotextile installation.
- D. Repair and reestablish the grades to specified tolerances where completed or partially completed surfaces become saturated, settled, eroded or compromised due to subsequent construction traffic or weather conditions.

3.05 AGGREGATE BASE COURSE AND SECONDARY STONE INSTALLATION

- A. The aggregate must be laid without damaging the soil bed, geo-textile liner or membrane, or underlying drains. It is very important not to create any depressions in the sub-grade with heavy equipment. The specified aggregate supplied must conform to the recommended specifications, as noted above. The finished crushed aggregate base supplied must be stable and permeable.
- B. The base course shall be constructed in layers or lifts. Each layer must be compacted in both directions to attain the specified compaction rate. The base

course total thickness shall be in accordance with the details shown on the drawings.

- C. The aggregate base course must be sloped a minimum of 0.5% from the center longitudinal axis towards the sidelines or as specified on the Plans.
- D. The finish surface slope of the base course shall not vary from the finish grade surface slope.
- E. The base course must be compacted in both directions to attain the specified compaction rate, which is 95% standard Proctor at a moisture content within 2% of optimum in accordance with ASTM D1557.

### 3.06 AGGREGATE FINISH COURSE INSTALLATION

- A. The final lift of aggregate layer shall be installed at the specified depth shown on the project drawings and details.
- B. The final lift material must be sloped 0.5% from the center longitudinal axis towards the sidelines unless otherwise specified.
- C. The final grade must be compacted in both directions to attain the specified compaction rate, which is 95% standard Proctor at a moisture content within 2% of optimum in accordance with ASTM D1557.
- D. The final grade of the finishing stone shall not vary from the specified grade by more than 3/16" of an inch from design grade, nor by more than 3/16" of an inch when measured under a 10 ft straightedge, in all directions. Laser guided fine grading is mandatory and shall be performed with laser equipped grading equipment (GPS grading will not be acceptable). This tolerance is required over the entire field. Check the tolerance-to-grade by means of an orbital laser once the stone is fine graded and compacted to proper density. Additional testing and inspection required as outlined within this specification.

### 3.07 CONCRETE PERIMETER CURB INSTALLATION

- A. The layout of the concrete curb shall be inspected by the Owner prior to construction to verify field location, size, and geometry.
- B. The curb shall be constructed with 4000psi concrete on subgrade compacted to 95% according to the Modified Proctor procedure (ASTM D1557) with 4" aggregate base.
- C. The curb shall be formed and poured in a uniform width as shown on the drawings. The curb shall include two (2) number four (4) rebar evenly spaced from the top and bottom.

- D. For Exposed curb, the top elevation of the curb shall match the top elevation of the infill and as shown on the drawings. The elevation of the preformed step for turf attachment shall be the same elevation as the finish stone surface.
- E. For Non Exposed curb, the top elevation of the curb shall be at the same elevation of the finished stone to provide a smooth transition to the terminal edge of the synthetic turf.
- F. Form curbs per contract document details including a 1.75" x 2" step for turf attachment to curb.

### 3.08 AGGREGATE BASE PREPARATION, REMEDIATION AND CONFORMANCE

- A. Once the aggregate base has been exposed after removing the existing turf system, the entire field shall be visually inspected for major settlements or deficiencies that will require further evaluation/consideration. Any major deficiencies shall be reported to the owner and engineer immediately.
- B. The top 3-4" of fine aggregate material shall be scarified and de-compacted across the entire field.
- C. Contractor shall provide clean washed #8 stone blended into existing aggregate material for 10 ft. wide transition to account for ½" settlement along existing curbs.
- D. The entire field shall be corrected for planarity by re-graded with laser guided equipment to establish a final field planarity of no more than 3/16- on an inch when measured with a ten foot (10 ft) straight edge.
- E. Contractor is responsible to perform a field planarity as-built. The as-built shall be submitted to the engineer and owner for review and approval prior to installing new synthetic turf. Contractor shall verify the field's planarity with a ten foot (10ft) straight edge to verify compliance with engineer present.
- F. The contractor shall be responsible for scheduling drainage/infiltration testing on the new aggregate materials by an independent testing agency at 4 locations per field via BSI 7044 infiltration tests. Any areas tested below 20 inches per hour shall be remediated at no additional costs to the owner.
- G. The turf contractor/installer shall accept the base in writing prior to installing the new turf material.

### 3.09 INSTALLATION OF HORIZONTAL STRIP DRAIN SYSTEM

- A. Install according to the manufacturer's specifications, 1"x12" Horizontal Strip Drain (Horizontal Flat Panel Drain) by American Drainage Systems, prefabricated flat composite under drain line as shown on drawings with lines spaced a maximum of 30' on center and terminating at perimeter drain trench per the layout and details on the drawings.

- B. The Contractor shall supply all necessary connectors and waterproof tape and is responsible for proper and secure connection at the seams. Horizontal drains shall terminate in the perimeter trench directly above the collector pipe.
- C. Tape the drains every 15' to the fabric using manufacturer's recommended tape. Do not use metal sod spikes.

END OF SECTION

**SECTION 02752  
BASE CONSTRUCTION AND RELATED WORK  
SYNTHETIC TURF FIELD SYSTEM REPLACEMENT**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions, Supplementary Conditions and Division 1 through Division 3 Specification Sections, apply to the Work of this Section.

1.02 RELATED WORK

- A. Section 02100: Site Preparation
- B. Section 02749: Sand/Rubber Synthetic Turf Field Surface and Related Work Synthetic Turf Field System Replacement
- C. Section 03200: Concrete Reinforcement
- D. Section 03300: Cast-In-Place Concrete

1.03 DESCRIPTION OF WORK

- A. Furnish all labor, materials, equipment and tools necessary to fine grade the existing base, perform remedial base work at the sidelines and install a typical Synthetic Turf Field System as indicated on the drawings and as specified herein. The installation of all new materials shall be performed in strict accordance with the specification, Synthetic Turf Manufacturer's instructions and in accordance with all approved shop drawings. A Synthetic Turf Field System includes all earthwork, base construction, and athletic field surfaces as follows:
  - 1. All engineering and layout work.
  - 2. Pouring in-place concrete around the perimeter edge as detailed on the drawings. Attachment of the synthetic turf to the concrete perimeter edge shall be accomplished per the contract documents.
  - 3. Installation of goal post foundations, sleeves, and goal posts and net systems.
  - 4. Installation of stone drainage base system per contract documents.
  - 5. Installation of communication boxes, irrigation quick coupler within accessible boxes and clean outs within accessible boxes.

6. Survey verification of stone drainage base elevation tolerances by the Owner's Engineer to check for conformance. Base as-built elevations to be submitted to Owner.

#### 1.04 QUALITY ASSURANCE

- A. Standards: Install Synthetic Turf System complying with Synthetic Turf Manufacturer's requirements and the plans and specifications.
- B. The Contractor, prior to installation of the Synthetic Turf, shall inspect the sub-base for conformance with the drawings and verify that the sub-base meets or exceeds the requirements of the Turf Installer. The Contractor shall be responsible for compaction testing of the sub-grade and sub-base to ensure compliance with the specifications and drawings. The Contractor shall survey the sub-grade and the sub-base to verify conformance with the approved drawings. The Contractor shall be responsible for correcting grades, elevations and planarity to conform to the drawings prior to installing the Synthetic Turf.
- C. The Contractor shall provide the necessary written certification that the aggregate base has been tested and meets the standards for infiltration, compaction and planarity. Written certification shall also be provided from turf manufacturer accepting the aggregate surface prior to placing artificial turf.
- D. Acceptance of the subgrade by the Owner will be based on the compaction testing and as-built survey verification provided by the contractor meeting compliance with design grade elevations for all disturbed areas within the field and outside of the field area. No aggregate, sod or finish materials shall be installed without the authorization from the owner/engineer that all grades have been properly established in accordance with the contract documents.

#### 1.05 EXPERIENCE

- A. Firm Experience:
  1. The Synthetic Turf aggregate base system shall be installed by an experienced Contractor who shall provide a list of five (5) completed field installations in the United States within the last five years, providing specific information about the name of the project, contact names, addresses, telephone numbers, year of the installation and type of turf material for the following type of fields:
    - a. A soccer field and a football field of 70,000 sq. ft. or larger.
    - b. A list of synthetic turf fields, other than soccer or football.
  2. The list shall include a minimum of five (5) fields that have been approved for game play by one of the following associations.

- a. National Collegiate Athletic Association – (NCAA)
  - b. National Federation of State High School Associations (NFHS)
  - c. Fédération Internationale de Football Associations (FIFA)
  - d. National Recreation and Park Association (NRPA)
3. The Contractor may use Subcontractors/Installers who employ only qualified and experienced Supervisors and Technicians skilled in the installation of the Synthetic Turf.
  4. The Subcontractor/Installer must demonstrate its past experience on at least five (5) acceptable preparations of the sub-base for the installation of Synthetic Turf system for full-size football, soccer or other athletic/recreational fields (minimum of 70,000 square feet) in the United States within the past five years. A completed list of all installations of vertically draining porous stone base and drainage systems, contact names, and phone numbers shall be submitted to the Owner for review to demonstrate the Subcontractor's/Installer's qualifications.
- B. Principal Staff Experience:
1. The Contractor shall detail the experience, educational background and training of proposed principal staff, as follows:
    - A. Contract Manager – The Contract Manager shall be a current and qualified employee of the Contractor; be skilled in the performance of the assigned duties; have a minimum of three years experience managing or supervising similar size projects; and have installed the proposed product at least five (5) installations.
    - B. On Site Supervisor – The Supervisor shall be a current and qualified employee of the Contractor; be skilled in the performance of the assigned duties; have a minimum of eighteen months experience in supervising similar size projects; and have installed the proposed product at a minimum of three (3) installations.
    - C. The turf installation crew personnel qualifications shall include the individual's resume, project list and contact information. Such information shall clearly identify the experience and qualifications in performing the type of work covered by these specifications. All information provided shall include a description of the identified projects, and the name and telephone number of a responsible contact person who can verify the information provided.
    - D. The Contractor shall not replace the named individuals for the duration of the contract unless the substitute individuals have equivalent qualifications as approved by the Owner.

1.06. DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials, in sealed unopened containers with manufacturer's labels intact.
- B. Store materials in protected area at a temperature not to exceed maximum and minimum temperatures as recommended by manufacturer. Protect products from UV degradation.

1.07 SUBMITTALS

- A. The Contractor shall submit the following information for approval prior to the start of base construction.
  - 1. A statement of the origin, composition, and manufacturer of all aggregate materials to be used in the work, including testing information supporting that the proposed aggregates meet or exceed the technical specifications.
  - 2. Supplier's material certifications for aggregate.
  - 3. Supplier's material certification for concrete.
  - 4. Product data sheets on all drainage pipe geotextile fabrics and fittings.
  - 5. Goal posts product data and shop drawings.
  - 6. Communication boxes, Irrigation Boxes and Clean out boxes.
  - 7. Fences and Gates, fence pole foundation details.

**PART 2 - PRODUCTS**

2.01 MATERIALS

- A. Concrete for field perimeter curb shall be VDOT A4 4000 PSI or a minimum strength of 4000 PSI.
- B. Geotextile Fabric shall be Mirafi 140N or approved equal, unless specified otherwise on plans.
- C. Drainage Pipe shall be HDPE highway grade ADS N-12, unless specified otherwise on plans. Flat panels to be manufactured by American Drainage Systems and consist of polymeric core surrounded by geotextile.
- D. The base aggregate shall consist of a minimum of six (6) inches of VDOT #57 coarse aggregate (open graded) type material or of a base stone material meeting the gradation specifications shown in the table below. The base aggregate must be



an open graded aggregate material and free draining, consistent with the vertical draining requirements of the Synthetic Turf Manufacturer.

BASE STONE GRADATION SPECIFICATIONS  
 %PASSING AND %RETAINED

| <u>Sieves</u>   | <u>Base Stone % Passing</u> | <u>Base Stone % Retained</u> |
|-----------------|-----------------------------|------------------------------|
| 1½" or 38.1mm   | 100                         | 0                            |
| 1" or 25.4mm    | 95-100                      | 0-5                          |
| ¾ or 19mm       | Optional                    | Optional                     |
| ½" or 12.7mm    | 25-60                       | 40-75                        |
| 3/8" or 9.51mm  | Optional                    | Optional                     |
| US #4 or 4.76mm | 0-10                        | 90-100                       |
| US #8 or 2.38mm | 0-5                         | 95-100                       |

- E. The secondary aggregate shall comprise, not to exceed two (2) inches, of VDOT #8 coarse aggregate (open graded) type material or of a secondary stone material meeting the gradation specifications as displayed in the table below. VDOT #8 coarse aggregate or the secondary stone material meeting the gradation specifications shall be transitioned in with the base aggregate and vibrated and rolled to provide a compacted sub-base.

SECONDARY STONE GRADATION SPECIFICATIONS  
 %PASSING AND %RETAINED

| <u>Sieves</u>    | <u>Secondary Stone % Passing</u> | <u>Secondary Stone % Retained</u> |
|------------------|----------------------------------|-----------------------------------|
| ½" or 12.7mm     | 100                              | 0                                 |
| 3/8" or 9.51mm   | 75-100                           | 0-25                              |
| US #4 or 4.76mm  | 5-30                             | 70-95                             |
| US #8 or 2.38mm  | 0-5                              | 95-100                            |
| US #16 or 1.19mm | 0                                | 100                               |

- F. The compacted sub-base of base aggregate and secondary aggregate shall be top-dressed with **not to exceed one (1) inch of porous, free draining material**, washed screenings that will provide a 90% minimum overall compaction of the finished aggregate base. The finishing aggregate shall meet the gradation specifications as shown in the table below.

TOP FINISH GRADATION SPECIFICATIONS  
 %PASSING AND %RETAINED

| <u>Sieves</u>         | <u>2" Top Finish<br/>% Passing</u> | <u>2" Top Finish<br/>% Retained</u> |
|-----------------------|------------------------------------|-------------------------------------|
| ½" or 12.5mm          | 100                                | 0                                   |
| 3/8" or 9.51mm        | 95-100                             | 0-5                                 |
| US#4 or 4.76mm        | 70-85                              | 15-30                               |
| US#8 or 2.38 mm       | 45-60                              | 40-55                               |
| US#16 or 1.19mm       | 25-40                              | 60-75                               |
| US#40 or<br>0.400 mm  | 2-12                               | 88-98                               |
| US#200 or<br>0.074 mm | 0-2                                | 98-100                              |

To ensure proper drainage: Permeability of complete aggregate system >20in/hr

Porosity of both stones > 25%

G. GOALS

1. The Contractor is responsible for providing and installing the stadium football goal post system comprising of two (2) Gooseneck Goal Posts (Sportsfield Specialties Model No. GPKR30HS 'Goal Pak' with access frame and turf cover SG2SGP), attachment hardware, reinforcement, access frame and turf covers over footings. Turf covers shall be removable in-order to access the base of the goal posts. Gooseneck length shall be field verified to match existing goal posts. The Goal Pak system shall include (2) two portable soccer goals per Model No. SG824R Round Faced Soccer Goal with SGMKR Integrated SGMobile Wheel Kit.
2. The Contractor is responsible for providing and installing the fields Combination "H" style goal post system comprising of two (2) Goal Posts and soccer goal net systems (Sports Field Specialties Model No. GP4900 with netting system GP4900-HD).

**PART 3 - EXECUTION**

3.01 MATERIAL TESTING

- A. Testing During Construction: To ensure that the quality of drainage stone materials remain constant from point of supply to jobsite, the following protocol shall be used by the Contractor:

1. Contractor shall submit a gallon supply of each base stone, secondary stone and finishing aggregate stone that meet the aforementioned properties for testing to ensure compliance by the Owner's testing agency prior to stone placement.
2. If anytime during the installation of the base stone, the secondary stone, and the finish aggregate stone the Contractor or owner observes a change in material and/or quality based on a visual inspection, then the Contractor must stop all operations immediately and contact the Owner/Engineer in order to perform additional testing on the materials in question. Failure to do so is the sole responsibility of the Contractor. The Owner will not be held accountable for any liability if the Contractor does not contact the Owner.
3. Before commencing the placement of synthetic turf on the stone drainage base, Contractor shall perform a conformance survey by a Licensed Surveyor registered in the State, on a 30-foot grid over the finished stone of the entire playing field for the Owner's approval. Additional layers of the base may be required to be as-built if indicated on the construction drawings.
4. Prior to commencing the base aggregate, confirm that the geotextile has been installed satisfactorily.
5. Protect the geotextile work as installation of the stone base is commenced.
6. Do not operate machinery directly over the geotextile fabric. Delivery trucks shall enter the field only from the designated entrance point. Stone shall be dumped at the entrance first and spread toward the furthest point of the field. Extreme care must be taken not to disturb the geotextile or subgrade surfaces. Ensure a minimum depth of 4" of aggregate between the geotextile fabric and equipment.
7. The Owner will have an independent testing agent conduct a field infiltration testing per The Standard Test Method for Infiltration Rate of Soils in Field Using Test Method BSI 7044 Method#4 or another equivalent percolation test to affirm the stone drainage base water permeability rate exceeds twenty (20) inches per hour. Testing will be a minimum of four (4) tests, one (1) per quadrant of field.

### 3.02 EXAMINATION

- A. Finished stone elevations shall be verified using laser survey. Finished grade must be within 3/16" of an inch from the elevations shown on the plans. The finished grade of the stone drainage base shall not vary more than 3/16 of an inch in ten feet. A laser grader must be used to verifiably meet these requirements.

- B. The surface to receive the Synthetic Turf shall be inspected by the Contractor, and reviewed with the Owner. The surface must be perfectly clean as installation commences and shall be maintained in that condition throughout the process.

### 3.03 GEOTEXTILE INSTALLATION

- A. Place geotextile promptly according to manufacturer's written instructions. Broom or roll geotextile smooth and free of wrinkles and folds. Overlap longitudinal joints 24 inches and transverse joints 24 inches.
- B. Protect geotextile from traffic and other damage and place aggregate the same day. Only place as much geotextile as can be covered with aggregate in the same working day.

### 3.04 SUBGRADE PREPARATION

- A. The subgrade must be sloped as specified on drawings but not less than a minimum slope of 0.5% for consistent base thickness, from the longitudinal center of the field towards the sidelines.
- B. The subgrade must be compacted in both directions to attain the specified compaction rate, which is 95% of standard Proctor at a moisture content within 2% of optimum in accordance with ASTM D1557. Subgrade shall also be proof rolled to check entire field for inadequate compaction requiring correction.
- C. The subgrade must be prepared to tolerances of not more than 1/2" from design grade to allow for even drainage. Subgrade shall be inspected with owner's representative prior to covering with geotextile. Contractor to provide written acceptance of subgrade prior to geotextile installation.
- D. Repair and reestablish the grades to specified tolerances where completed or partially completed surfaces become saturated, settled, eroded or compromised due to subsequent construction traffic or weather conditions.

### 3.05 AGGREGATE BASE COURSE AND SECONDARY STONE INSTALLATION

- A. The aggregate must be laid without damaging the soil bed, geo-textile liner or membrane, or underlying drains. It is very important not to create any depressions in the sub-grade with heavy equipment. The specified aggregate supplied must conform to the recommended specifications, as noted above. The finished crushed aggregate base supplied must be stable and permeable.
- B. The base course shall be constructed in layers or lifts. Each layer must be compacted in both directions to attain the specified compaction rate. The base course total thickness shall be in accordance with the details shown on the drawings.
- C. The aggregate base course must be sloped a minimum of 0.5% from the center longitudinal axis towards the sidelines or as specified on the Plans.

- D. The finish surface slope of the base course shall not vary from the finish grade surface slope.
- E. The base course must be compacted in both directions to attain the specified compaction rate, which is 95% standard Proctor at a moisture content within 2% of optimum in accordance with ASTM D1557.

### 3.06 AGGREGATE FINISH COURSE INSTALLATION

- A. The final lift of aggregate layer shall be installed at the specified depth shown on the project drawings and details.
- B. The final lift material must be sloped 0.5% from the center longitudinal axis towards the sidelines unless otherwise specified.
- C. The final grade must be compacted in both directions to attain the specified compaction rate, which is 95% standard Proctor at a moisture content within 2% of optimum in accordance with ASTM D1557.
- D. The final grade of the finishing stone shall not vary from the specified grade by more than 3/16" of an inch from design grade, nor by more than 3/16" of an inch when measured under a 10 ft straightedge, in all directions. Laser guided fine grading is mandatory and shall be performed with laser equipped grading equipment (GPS grading will not be acceptable). This tolerance is required over the entire field. Check the tolerance-to-grade by means of an orbital laser once the stone is fine graded and compacted to proper density. Additional testing and inspection required as outlined within this specification.

### 3.07 CONCRETE PERIMETER CURB INSTALLATION

- A. The layout of the concrete curb shall be inspected by the Owner prior to construction to verify field location, size, and geometry.
- B. The curb shall be constructed with 4000psi concrete on subgrade compacted to 95% according to the Modified Proctor procedure (ASTM D1557) with 4" aggregate base.
- C. The curb shall be formed and poured in a uniform width as shown on the drawings. The curb shall include two (2) number four (4) rebar evenly spaced from the top and bottom.
- D. For Exposed curb, the top elevation of the curb shall match the top elevation of the infill and as shown on the drawings. The elevation of the preformed step for turf attachment shall be the same elevation as the finish stone surface.
- E. For Non Exposed curb, the top elevation of the curb shall be at the same elevation of the finished stone to provide a smooth transition to the terminal edge of the synthetic turf.

- F. Form curbs per contract document details including a 1.75" x 2" step for turf attachment to curb.

3.08 AGGREGATE BASE PREPARATION, REMEDIATION AND CONFORMANCE

- A. Once the aggregate base has been exposed after removing the existing turf system, the entire field shall be visually inspected for major settlements or deficiencies that will require further evaluation/consideration. Any major deficiencies shall be reported to the owner and engineer immediately.
- B. The top 3-4" of fine aggregate material shall be scarified and de-compacted across the entire field.
- C. Contractor shall provide clean washed #8 stone blended into existing aggregate material for 10 ft. wide transition to account for 1/2" settlement along existing curbs.
- D. The entire field shall be corrected for planarity by re-graded with laser guided equipment to establish a final field planarity of no more than 3/16- on an inch when measured with a ten foot (10 ft) straight edge.
- E. Contractor is responsible to perform a field planarity as-built. The as-built shall be submitted to the engineer and owner for review and approval prior to installing new synthetic turf. Contractor shall verify the field's planarity with a ten foot (10ft) straight edge to verify compliance with engineer present.
- F. The contractor shall be responsible for scheduling drainage/infiltration testing on the new aggregate materials by an independent testing agency at 4 locations per field via BSI 7044 infiltration tests. Any areas tested below 20 inches per hour shall be remediated at no additional costs to the owner.
- G. The turf contractor/installer shall accept the base in writing prior to installing the new turf material.

END OF SECTION

## SECTION 02790

### SYNTHETIC RUNNING TRACK SURFACING

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division One through Division Two Specification Sections, apply to the Work of this Section.

##### 1.02 RELATED WORK

- A. Section 02510 - Paving and Surfacing
- B. Section 02831- Chain Link Fences and Gates

##### 1.03 REFERENCE STANDARD

- A. Applicable standards and details of Virginia Department of Transportation "Standards and Specifications."

##### 1.04 WORK DESCRIPTION

- A. Construct a synthetic running track surface as indicated on civil drawings. Work of this section shall include the following:
  - 1. Excavation and preparation of sub grade for area designated to receive track surfacing, as needed. Legally dispose of excess materials offsite. If existing asphalt remains, install Petromat fabric, prior to 2" asphalt overlay.
  - 2. Construction of a suitable asphalt base for track surfacing, as needed.
  - 3. Install a full depth, poured in place, two component UV stabilized elastomeric polyurethane dual durometer synthetic surfacing system with embedded textured finish. Min thickness 10mm.
  - 4. Layout and paint all track lines and event markings as required and specified by current IAAF and NCAA rules.
  - 5. Perimeter fencing is covered under Section 02831.
- B. Track surfacing shall be uniform in thickness, texture, and color, in accordance with grades, cross sections, pitch and free of all depressions and ridges.

## 1.05 SUBMITTALS

- A. Submit running track surfacing manufacturer's product data, catalog cuts, application specifications, maintenance information and office samples in accordance with Section 01340.

## 1.06 QUALITY ASSURANCE

- A. Contractor and Manufacturer Qualifications:

1. The Manufacturer must have a minimum of 10 years of experience with the compounding of two-part polyurethane for athletic surfaces. A reference list of installed projects, with installation dates- must be submitted.
2. The Manufacturer must offer a minimum of (4) IAAF Certified Track Systems.
3. The Installation Contractor of the running track shall be certified by the approved Manufacturer and shall use only workmen who are trained and experienced in the installation of the track surface.
4. The Contractor must have a minimum of 5 year's experience in the installation of full depth poured in place two component elastomeric polyurethane synthetic track surfacing. A reference list must be submitted.

- B. Running Track: The finished system shall meet the following criteria:

1. Force Reduction: 30% to 50%, inclusive.
2. Modified Vertical Deformation: .6mm to 1.8mm, inclusive.
3. Friction/TRRL Skid Resistance: > 47.
4. Tensile Strength: > .5
5. Elongation at break: > 40.
6. Resistant to scuffing and shedding of granules.
7. Nominal Thickness > 10mm.

- C. The Contractor will have and maintain local representation, within 250 miles of Fairfax City. This is to facilitate the required warranty response of 4 hours for emergency response, and 24 hours for regular maintenance and repairs.



## 1.07 WARRANTY

Synthetic track surfacing system shall be fully guaranteed against faulty workmanship and material failure for a period of 5 years from the date of acceptance.

Provide, as a part of the Warranty, documents stating that the materials applied conform to the manufacturer's specifications and that the material will not separate from the asphalt or concrete base, blister, bubble, fade, crack or wear excessively during the life of the warranty.

The synthetic surfacing contractor and owner will annually walk and inspect the synthetic surface during the life of the warranty. Warranty issues will be repaired and for non-warranty items a method for correction will be presented.

## PART 2 - PRODUCTS

- 2.01 A. Running Track Surfacing: An IAAF Certified surface, impermeable, seamless, spike resistant full pour polyurethane track system. The synthetic surface consists of an engineered force reduction layer composed of integrated SBR rubber and embedded or encapsulated EPDM granule top wear layer. The two component UV stabilized elastomeric polyurethane is to be compounded from polyol and isocyanate components, based on 100% Methylene Diphenyl Isocyanate (MDI). No Toluene Diisocyanate Isocyanate (TDI) will be allowed. Nominal thickness: 10mm.
1. Approved Manufacturers:
    - a. "BSS 1000" Synthetic Running Track Surface, Beynon Sport Surfaces, Inc. Hunt Valley, MD. (basis of specification).
    - b. "Conipur MX," BASF Chemicals, Conica Sport Surfaces, Shakopee, MN.
    - c. "Resisport FP" Atlas Sport Surfaces, Tualatin, OR
    - d. Pre-bid approved substitution in accordance with Section 01630.
  - B. Marking Paint: Line marking paint approved by the track surface manufacturer.

- C. Track Surface Base: Three (3) inch VDOT specification SM-9.5 plant-mixed, bituminous concrete over a minimum of 10 (ten) inches of VDOT Specification 21A stone, compacted to 95% proctor density and cement treated.

### **PART 3 - EXECUTION**

#### **3.01 INSPECTION**

- A. Examine the areas and conditions under which the work of this Section shall be installed. Provide a core sample of the existing conditions including asphalt and subbase for review with Owner. Correct conditions detrimental to the proper completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

#### **3.02 PREPARATION**

- A. Fill excavated areas to the minimum depths of stone and bituminous concrete base as indicated in PART 2. Base shall be clean, dry, free draining, and free of foreign materials.
- B. Verify weather conditions before beginning installation of track surface. Do not place track materials when ambient nighttime temperature is expected to fall below 50°F. Installation shall be executed only in warm, dry conditions.

#### **3.03 INSTALLATION**

- A. It is the responsibility of the asphalt paving contractor to provide documentation that the paving meets those requirements set forth for asphalt paving. Additionally, the asphalt is to cure for a minimum of 28 days prior to synthetic surfacing being applied. Asphalt compaction tests are to be provided showing a compaction of 95% or greater. The asphalt will be checked with a 10-foot straightedge in all directions. Those areas not in conformance will be repaired and/or replaced by the paving contractor. Flooding the asphalt surface to locate irregularities is highly recommended.

## 3.04 MATERIALS

## A. Elastomeric Polyurethane

A two-component U.V. stabilized elastomeric polyurethane compounded from polyol and isocyanate components, based on one hundred percent Methylene Diphenyl Isocyanate (MDI). No Toluene Diisocyanate (TDI) will be allowed. The elastomeric polyurethane shall be red in color.

## B. EPDM Granulate

The EPDM granulates shall be 1 to 3mm in size and peroxide cured.

The EPDM granulates and the U.V. stabilized elastomeric polyurethane shall be color matched.

## C. Rubber Granulate

Fine mesh Styrene Butadiene Rubber (SBR) processed ground to a graded size not to exceed 20 mesh in size.

A maximum of twenty percent, by weight of the SBR will be allowed in the force reduction layer.

## D. Force Reduction Layer

The fine mesh SBR granules and UV stabilized elastomeric polyurethane shall be metered and mixed together on site to regulate the ratio/quantity of SBR, not to exceed 14 percent in the system and to insure an even distribution of the granules throughout the 5mm force reduction layer. No multi layered system allowed.

## E. Resilient Wearing Layer- The 1mm to 3mm EPDM granules shall be mechanically integrated with an UV stabilized elastomeric polyurethane to the full depth of the 5mm wearing layer. The resilient textured finish shall be a dense matrix of embedded EPDM granules.

The elastomeric polyurethane shall be red in color, unless otherwise specified.

## F. Equipment: The synthetic track surfacing system components shall be processed and installed by specially designed machinery with automatic electronic portioning, which provides continuous mixing, feeding and finishing for accurate quality-controlled installation.

G. Site Conditions: Installation shall not take place if adjacent or concurrent construction generates excessive dust, abrasives or any other byproduct that, in the opinion of the installer, would be harmful

to the track material, until completion of such works. Installation temperature in 50 degrees minimum and rising. Installation shall be executed only in dry conditions.

H. Line Marking and Event Layout:

1. Line Marking Paint

Single-component, moisture cured, aliphatic polyurethane paint.  
Layout: Line striping and event markings shall be laid out in accordance with current IAAF and NCAA rules.

2. Certification: Upon completion of the installation, the owner shall be supplied with all necessary computations and drawings as well as a letter of certification attesting to the accuracy of the markings.

I. Line Marking Paint:

Single-component, moisture cured, aliphatic polyurethane paint.

3.05 POST CONSTRUCTION TESTING AND ACCEPTANCE

- A. The finished running track surface shall be uniform in thickness and texture. Thickness shall meet manufacturer's minimum recommended thickness. Owner shall reserve the right to perform thickness testing, and if found non-compliant, require the contractor to install additional courses. Owner also reserves the right to reject the installation based on non-uniform distribution of granule sizes.

3.06 PROTECTION

- A. Protect running track surfaces from damage by work of other trades until accepted by owner.

3.06 CLEAN UP

- A. Remove all excess materials and debris associated with the Work of this Section from the project area and legally disposed of offsite.

END OF SECTION

## SECTION 02791

### TENNIS COURT SURFACING AND NETS

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions and Division One through Division Five Specification Sections, apply to work of this Section.

##### 1.02 RELATED WORK

- A. Section 02510 - Paving and Surfacing
- B. Section 02831 - Chain Link Fences and Gates

##### 1.03 REFERENCE STANDARDS

- A. Applicable standards and details of the Virginia Department of Transportation "Standards and Specifications."

##### 1.04 WORK DESCRIPTION

- A. Construct tennis courts as indicated on Civil Drawings, in number, size, and locations as shown. Work of this Section shall include the following:
  - 1. Excavation and preparation of subgrade in areas designated to receive court surfacing. Legally dispose of excess materials.
  - 2. Construction of suitable base for surfacing.
  - 3. Construction of court surface including game lines, net posts and footings and nets.
  - 4. Perimeter court fencing is covered under Section 02831. Coordinate court surface installation with installation of fencing line posts and fence post footings.
- B. Court surfaces shall be uniform in texture and color, in accordance with grades, cross sections and pitch required by drawings, and free of all depressions and ridges.

##### 1.05 SUBMITTALS

- A. Submit court surface manufacturer's product data, catalog cuts, application specifications, maintenance information, and office samples in accordance with Section 01340.

**1.06 QUALITY ASSURANCE**

- A. The installer of the court surfacing shall be certified by the approved manufacturer, and shall use only workmen who are trained and experienced in the installation of the court surface.
- B. Do not store resurfaces or color system materials in direct sunlight. During cold weather, store materials in a manner to prevent freezing. All materials shall be kept sealed in original containers until ready for use.

**1.07 WARRANTY**

- A. Provide minimum one (1) year warranty to cover materials and installation. Contractor shall repair or replace defective surface, at no cost to Owner, during the warranty period.

**PART 2 - PRODUCTS****2.01 Court Surfacing:**

- A. Approved Manufacturer: "Premier Sports Coatings" asphalt resurfacer and "Premier Sports Coatings" acrylic color sealer, as manufactured by ATC CORP, Baltimore, Maryland, 1-410-477-4400, or pre-bid approved substitution in accordance with Section 01630.

**2.02 Tennis net posts: 2 7/8" O. D. galvanized steel posts with "dark green" baked on polyester powder coat finish and heavy duty external take-up winding device, equipped with quick release, detachable winding handle.**

- A. Approved manufacturer: "Douglas Premier XS Tennis Post with Stainless Steel Gears", or pre-bid approved substitution in accordance with Section 01630.

**2.03 Tennis nets: Double synthetic spun polyester headband, quadruple sewn to a braided polyethylene body, with black vinyl side pockets, double sewn bottom band, and incorporating spur grommets and fiberglass dowels. Net shall not crack, yellow, pink, face, or show effects from acid rain. Net shall remain pliable in cold weather. Net dimensions: 41'-9" long x 3'-3" high.**

- A. Netting: Single twine mesh, made from heavy-duty 3mm black braided polyethylene, with minimum B/S of 285 pounds. Mesh shall be 1-3/4" square.
- B. Cables: 6mm diameter PVC coated wire, with mechanically spliced double loops.
- C. Dowels: 10mm diameter polished fiberglass.
- D. Grommets: Nickel-plated brass, spur type.

- 2.04 Game Lines: Two (2) inch wide white lines, 100% acrylic game line paint. Oil base paint or lacquer is not acceptable.
- 2.05 Court Paving: Refer to Civil Drawings for court paving cross-section detail.
- 2.06 Concrete for footings and anchors: Class "B", 3000 PSI.

### **PART 3 - EXECUTION**

#### **3.01 INSPECTION**

- A. Examine the areas and conditions under which the Work of this Section shall be installed. Correct conditions detrimental to the proper condition of the Work. Do not proceed until unsatisfactory conditions have been corrected.
- B. Do not install court surfacing when the ambient temperature is below 50°F or above 140°F. Do not apply when rain is imminent.

#### **3.02 PREPARATION**

- A. Fill excavated areas to the minimum depths of stone and bituminous concrete base as indicated in PART 2. Base shall be allowed to cure for a minimum of fourteen (14) days prior to the application of court surfacing.
- B. Prior to applying court surfacing, flood court area with water. Allow water to stand for one (1) hour at a minimum temperature of 75° with sun. Any areas exhibiting standing water or "birdbaths" over 1/16" in depth shall be marked for patching.
- C. Net posts, footings, and tie-downs shall be installed prior to placing 2" SM-2A base course. Footings shall be held 2" below finish grade, with top of sleeves extending 6" above finish grade. Patch area identified in Paragraph B as follows:
1. Using a straightedge of sufficient length to bridge the low area, screed an application of "Premier Sports Coatings" asphalt patch and leveling compound, or comparable compound recommended by a pre-bid approved manufacturer.
  2. After patching has cured, check patched area with a stringline to insure that the area has been brought flush with surrounding surface.
  3. Roller marks: Apply asphalt patching and leveling compound along roller marks and feather with a squeegee.
- D. After patching, completely clean court base surface by means of high-powered blowers, removing all dust, dirt and debris, and leaving areas completely dry.

### 3.03 COURT SURFACING

- A. Apply one (1) application of asphalt resurfacer at the rate of .12 gallons per square yard (undiluted form). Mix resurfacer with potable water at the rate recommended/specified by the manufacturer. Allow material to cure at least twenty-four (24) hours prior to application of color coats.
- B. Color coats: Apply acrylic color sealer in three (3) applications for a total of 0.14 gallons per square yard (undiluted form). Mix color sealer with 80-100 mesh silica sand and potable water at rates specified by the manufacturer. Courts shall be thoroughly scraped between color sealer applications to remove ridges. Apply succeeding coat only after preceding coat has thoroughly dried (2-3 hours).
  - 1. Colors shall be: "dark green" playing area with "red" borders.
- C. Game Lines: Apply marking paint only after the color sealer has completely cured (two (2) to four (4) days depending on conditions). Accurately locate and mark game lines by snapping chalk lines. Use soft-soled shoes and kneepads to prevent surface indentation during marking and painting operations. Uneven line width and undulating or ragged line work shall be rejected.

### 3.04 FOOTINGS, NET POSTS, AND FIXTURES

- A. Footings: Footings shall be two (2) feet by two (2) feet by three (3) feet in depth, except they shall be belled at the bottom a minimum of 30".
- B. Ground sleeves shall be schedule 40 PVC pipe, 24" long four (4) inches above the top of the 2" base course.
- C. Tie downs: Install center tie-down anchors, compatible with nets. Anchors shall be set in twelve (12) inch by twelve (12) inch by twelve (12) inch deep footings. Top of footings shall protrude four (4) inches above the top of the 2" base course.

### 3.05 NETS AND ACCESSORIES

- A. Install nets and winding devices in accordance with manufacturer's written instructions.

### 3.06 PROTECTION

- A. Protect tennis court surfaces, posts, tie downs, nets and winding devices from damage by work of other trades until accepted by owner.

### 3.07 CLEAN-UP

- A. Remove all excess materials and debris associated with the Work of this Section from the project area and legally dispose of offsite.

END OF SECTION



## SECTION 02810

### FIELD IRRIGATION SYSTEMS

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 through Division Two Specification Sections, apply to the work of this Section.

##### 1.02 DESCRIPTION OF WORK

- A. Design and install field irrigation systems(s) for athletic fields as indicated on the contract documents
- B. Design Parameters:
  - 1. Assume 120 GPM @ 50PSI for all irrigation systems.
  - 2. Individual field designs:
    - a. Soccer Field: Seven (7) zones minimum 28 sprinkler heads (total).
    - b. Softball Field: Three (3) zones minimum 19 sprinkler heads (total).
    - c. Baseball Field: Eight (8) zones minimum 32 sprinkler heads (total).
    - d. Football Field: Nine (9) zones minimum 31 sprinkler heads (total).
    - e. Practice Fields: Seven (7) zones, minimum 28 sprinkler heads (total).
- C. Design Requirements:
  - 1. Prepare design drawings at 1"=50' or larger, indicating system point of connection; major components, such as controllers, backflow preventers, valves, valve boxes, zone layouts, heads and nozzle types. Provide a drawing legend identifying all components.
  - 2. Include pressure loss calculations for each field system design.
  - 3. Include proposed operating schedules based on midsummer, no rain conditions.

4. Sprinkler Head Spacing: based on wind conditions of five (5) mph or less, the maximum allowable spacing shall be 60% of the diameter of throw.
5. Pipe Sizing: Supply pipe shall be sized so that the velocity of flow shall not exceed five (5) feet per second (FPS) at any point in the main line, and six (6) FPS in the lateral lines.
6. Control valves shall be sized so that no more than 5% loss of system static pressure is incurred. Valves shall match the line size, or no more than one (1) pipe size smaller than the pipe in which they are installed.
7. Back flow prevention devices shall be sized to match line size, or no more than one (1) pipe size smaller the pipe in which they are installed.

#### 1.03 RELATED WORK

- A. Water Service: Refer to the Civil Drawings of the Contract documents for location of connection and service size. Service shall be separately metered.
- B. Electric Service: Refer to utility site plan contained in Electrical Drawings of the Contract Documents for service location and characteristics.

#### 1.04 CONTRACTOR QUALIFICATIONS

- A. Contractor shall be licensed, insured and bonded, and shall be a member of the Irrigation Association.
- B. Contractor shall have a minimum of five (5) years successful experience in the design and installation of similar projects.

#### 1.05 REFERENCE STANDARDS

- A. The Irrigation Association standards for certification of irrigation designers and contractors.

#### 1.06 SUBMITTALS

- A. Submit catalog data and materials list indicating manufacturers, model numbers, and performance data for all the components listed in Part 2.
- B. Submit design drawings prepared in accordance with 1.02C.

#### 1.07 PROJECT RECORD INFORMATION

- A. Contractor shall keep an accurate record of all changes and corrections to the layout shown on the Drawings. Submit "As Built" information as part of the requirements of Section 01720.

- B. "As Built" information shall include control valve wiring routing paths, wire splice locations, and controller locations.

#### 1.08 WARRANTIES

- A. Guarantee all workmanship, materials, fixtures and equipment to be free of defects for a period of one (1) year from the effective date of warranty commencement; except that defects due to damage caused by others shall not be covered. Refer to Section 01740 for effective date of warranty commencement.
  - 1. Settlement at trench excavations shall be corrected by the Contractor during the one year warranty period.
  - 2. Winterization of the irrigation systems shall be included in the warranty period.

### **PART 2 - PRODUCTS**

#### 2.01 GENERAL

- A. Materials and equipment specified in this Section shall establish the standard of quality and level of performance for field irrigation systems. Comparable products of other manufacturers shall be considered by the Owner in accordance with Section 01630 (Substitutions and Product Options).

#### 2.02 PIPE AND FITTINGS

- A. PVC pipe (up to and including 2"): White, schedule 40, SDR-21, Class 200, NSF approved; complying with ASTM D241 and ASTM D1784.
- B. PVC pipe (2½" and larger): White, schedule 40, SDR-26, Class 160, NSF approved; complying with ASTM D2241 and ASTM D1784.
- C. Fittings: Schedule 40, ASTM D2466.
- D. Primer for pipe connections: NSF approved, ASTM F656.
- E. PVC pipe solvent: NSF approved, ASTM D2855, or ASTM D2564.
- F. Gaskets: SDR-21; Cresline.

#### 2.03 VALVES AND VALVE BOXES

- A. Valves

1. Approved manufacturer: Rain Bird Sprinkler Mfg. Corp., PGA Series, matched to pipe size.
2. Features:
  - a. PVC construction, globe/angle configuration, solenoid activated.
  - b. Capable of withstanding constant 150 psi pressure and up to 10 gpm flow.
  - c. Normally closed, slow closing.
  - d. Power 24 VAC 50/60 cycle.
  - e. Manual internal bleed.
  - f. Valve construction shall allow removal and replacement of all internal parts without disturbing the installation.
- B. Valve Boxes: Carson Model 1419-12.
- C. Quick Coupling Valves
  1. Hunter or Rainbird 44RC with "DO NOT DRINK" cap, and one key per coupler, two minimum per contract.

#### 2.04 SPRINKLER HEADS

- A. Approved manufacturer: Hunter Industries Model I-25 Plus rotary sprinkler.
- B. Features:
  1. Pop-up height: 3 ½".
  2. Discharge rate: 3.8 to 31.5 gpm.
  3. Radius: 40' to 73'.
  4. Pressure range: 40 psi to 100 psi.
  5. Nozzle trajectory: 250-25 degrees.

#### 2.05 CONTROL WIRE

- A. Approved manufacturer: Paige Electric Company, P7079 D-3.
- B. Characteristics
  1. UL/UF direct burial, 14 AWG
- C. Wire Splice Connectors: Waterproof, direct burial, rated for 30 volts minimum.

## 2.06 SWING JOINTS

- A. Approved manufacturer: Spears Model 5807

## 2.07 CONTROLLER

- A. Approved manufacturer:

1. Middle Schools and High Schools: Hunter Industries Model ICC-800-PL (48 zones).
2. Elementary Schools: Hunter Industries Model PROC-800-PL (12 zones).

- B. Features:

1. 8 station controller, plastic cabinet (NEMA 3R), 32 station capacity; UL listed.
2. Transformer input: 120/230VAC, 50/60 Hz; output: 24VAC, 1.5A (40VAC).
3. Seasonal adjustment: 10% to 150%.
4. Self diagnostic circuit breaker.
5. 365 day calendar.
6. Programmable delay between stations up to 10 hours; programmable rain delay up to 7 days.
7. Lithium Battery backup (ten year life).

## 2.08 BACKFLOW PREVENTER

- A. Approved manufacturer: Wilkins Water Control Products (Division of Zurn Industries) Model 975XLV200.

- B. Features:

1. Reduced pressure principle assembly.
2. 90° union elbows on both inlet and outlet.

## 2.09 BOOSTER PUMP

- A. Approved manufacturer: Berkeley B1 ½ TPMS

- B. Features: Close coupled, end suction centrifugal pump; cast iron motor bracket, multiple taps.

**PART 3 - EXECUTION**

## 3.01 PREPARATION

- A. Prior to beginning work, notify "Miss Utility" in order to establish location(s) of public underground utilities, if any. Verify presence of privately maintained site utilities indicated on project documents, including locations of water supply and electric service for the irrigation system(s).
- B. Verify that size of water supply line and electric service are adequate to serve system design. Notify Owner of any discrepancies or deficiencies that would adversely affect proper system performance. Do not begin work until corrections have been made.

## 3.02 PIPE ASSEMBLY

- A. Keep pipe free of dirt, rocks, shavings and other debris. Cut pipe square and true, free of shavings.
- B. Use primer and solvent to join pipe and fittings in accordance with solvent manufacturer's written directions. Allow set up time prior to pipe pressurization per solvent manufacturer's recommendations.
- C. Install pipe to allow for expansion and contraction.
- D. Thrust Blocks:
  - 1. Provide concrete thrust blocks where piping changes direction, at dead ends, or at valve locations where thrust may be expected to occur.
  - 2. Install between the fittings and undisturbed soil of the adjacent trench wall.
- E. Trenching and Backfilling:
  - 1. Depth of bury shall be as follows:
    - a. Pipe sizes up to 1.25": 10" minimum cover.
    - b. Pipe sizes over 1.25": 18" minimum cover.
  - 2. Backfill: The first 6" shall be free of rock or other foreign matter 2" in diameter or larger. The remaining backfill shall be laid in 6" maximum lifts and tamped until flush with finished grade.
  - 3. Pipes installed in the same trench shall be separated with a minimum of 2" of soil.
- F. Tracer Wire

1. For all pipe install tracer wire in accordance with the IPC 703.6.

### 3.03 VALVES

- A. Valves shall be installed plumb within valve boxes with all handles, bolts, connection and electrical splices accessible through the box opening.

### 3.04 CONTROL WIRING

- A. Conform to electrical requirements of the VUSBC for installation of wiring.
- B. Minimize the number of splices. All splices shall be located in valves or splice boxes.
- C. When located in common trench with the main line, install wiring at the same invert as the line.
- D. Provide expansion coils at all valves and at 300' intervals between valves.
- E. Tie wire bundles together before splicing to prevent strain on splice. Tape or conch wire with cable cinches at 50' maximum intervals. Maintain slack in wire to accommodate expansion and contraction.
- F. Above ground wire shall be installed in conduit.
- G. Valve wiring shall be the same color from controller to valves. Neutral wire shall be white.

### 3.05 SPRINKLER HEADS

- A. Set heads to finished grade in accordance with civil drawings and/or elevations established on the design drawings.

### 3.06 DRAIN VALVES

- A. Manual: Install at low points on main and lateral lines. Provide valve access boxes with a two (2) cubic foot gravel sump and soil separator.
- B. Automatic (if required): Same requirements as manual, except installed 45° angle down. Do not exceed 10' of head upstream.

### 3.07 TESTING AND ADJUSTMENT

- A. Pressure test of main line. Design pressure shall be applied for a period of 24 hours. Repair leaks and retest for another period of 24 hours. Continue testing until all leaks have been repaired and system is watertight.
- B. Sprinkler Heads:

1. Disassemble heads for flushing. System shall be flushed under full pressure until clean. Re-install head components and nozzles; adjust radius and arc for optimum coverage and to reduce overspray.
  2. Adjust head locations to achieve full coverage of field areas.
- C. System Operation:
1. Test operating sequence to verify proper operation of controller, control wiring, valves and heads.
  2. Verify proper performance of drain valves.

### 3.08 CONTRACT CLOSEOUT

- A. Remove all excess material from work area. Restore field areas damaged by installation operations.
- B. Instruct owner's representative and school staff in the proper operation and maintenance procedures for the field irrigation system(s).
- C. Submit project record information, operating and maintenance manuals, and warranties to the Owner in accordance with Division One requirements.

END OF SECTION



## SECTION 02830

### CHAIN LINK FENCES - REPAIR

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specifications Sections, apply to this Section.

##### 1.02 DESCRIPTION OF WORK

- A. Repair existing chain link fencing as indicated on the Drawings. Include the following as required by extent of repair:
  - 1. Fence fabric and posts.
  - 2. Excavation for post bases.
  - 3. Concrete anchorage for posts.

##### 1.03 RELATED WORK

- A. Section 02930: TOPSOILING and SODDING.
- B. Section 03300: CAST-IN-PLACE CONCRETE.

##### 1.04 WORK EXCLUDED

- A. Temporary Construction Fence.

##### 1.05 ERECTOR QUALIFICATIONS

- A. Minimum of two years experience installing similar fencing.

##### 1.06 REFERENCE STANDARDS

- A. Chain Link Fence Manufacturers Institute (CLFMI) - Standard of chain link fence installation.
- B. ASTM A120 - Black and hot dip zinc coated (galvanized) welded and seamless steel pipe.
- C. ASTM A123 - Zinc (hot-galvanized coatings on products fabricated from rolled, pressed and forged steel shapes, bars, and strip).
- D. ASTM C94 - Ready-mixed concrete.
- E. FS RR-F-00191 - Fencing, wire and post, metal (chain-link fence fabric).

**1.07 SHOP DRAWINGS AND PRODUCT DATA**

- A. Submit shop drawings and product data in accordance with Section 01340.
- B. Clearly indicate plan layout, grid, spacing of components, accessories, fitments, and anchorage.
- C. Submit manufacturer's installation instructions and procedures including standard details of fence and gate installation.

**PART 2 - PRODUCTS****2.01 ACCEPTABLE MANUFACTURERS**

- A. Anchor Fence, Inc.
- B. Sonco Fence, Inc.
- C. Cyclone Fence
- D. Allied Tube and Conduit (Fence Division)
- E. Master Halco
- F. Other domestic manufacturers meeting the requirements of this section.

**2.02 MATERIALS**

- A. Framework: ASTM A120; Schedule 40, butt weld, standard weight, hot dip galvanized to 2.0 ounce per square foot.
- B. Mesh: ASTM A116-88; FS RR-F-00191, Type 1 - Zinc-coated steel.

**2.03 CONCRETE MIX**

- A. Concrete: ASTM C94, normal Portland Cement, 2000 psi at 28 days, 2 inch to 3 inch slump.

**2.04 COMPONENTS**

- A. Line Posts: 2.38 inch diameter, steel tubing.
- B. Corner and Terminal Posts: 2.875 inch diameter steel tubing.
- C. Top and Brace Rail: 1.66 inch diameter, plan end, sleeve coupled.
- D. Gate Frame: 1.66 inch diameter, steel tubing.

- E. Caps: Cast steel, hot dip galvanized, sized to post dimension, set screw retained.
- F. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings, steel galvanized.
- G. No Climb Fabric: Shall be as follows or as indicated on the Drawings.
  - 1. 96 inches high: One piece of Polyolefin coated 9-gauge wire woven in a 5/8-inch chain link diamond mesh pattern. Top and bottom selvage shall have a knuckled finish. (Master Halco, Basis of design)
- H. Fabric: 1-3/4 inches diamond mesh, interwoven, 11 gauge, top and bottom selvage knuckle end closed.
- I. Bottom Tension Wire: 6 gauge steel single strand, galvanized.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Install line posts, corner posts, top rails, post caps, fabric and gates, to provide a rigid structure for fence of height to match existing. Use manufacturer's standard fittings, fasteners and hardware.
- B. Maximum Spacing of Posts: CLFMI Standard.
- C. Install line, corner, and terminal posts plumb, set in concrete footings as specified in CLFMI Standard.
- D. Set post to within 6 inches from bottom of concrete footing. Slope top of concrete for water runoff. Set top of footing 2 inches above finished grade.
- E. Position bottom of fabric 2 inches above finished grade with tension wire stretched taut between posts.
- F. Pass top rail through line post tops to form continuous bracing. Install 7-inch long couplings midspan at pipe ends.
- G. Install center and bottom brace rail on corner.
- H. Fasten fabric to top rail, line posts, braces, and bottom tension wire with wire ties maximum 15 inches centers.
- I. Attach fabric to end corner with tension bars and tension bar clips.
- J. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is the least dimension.

3.02 CLEANUP

- A. Remove all trash, debris, and excess materials associated with the work of this Section from the job site and dispose of legally.

END OF SECTION

## SECTION 02831

### CHAIN LINK FENCES AND GATES

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section.

##### 1.02 DESCRIPTION OF WORK

- A. PVC coated Fence fabric posts; rails, tension components and fittings for all fencing including, perimeter and interior site fencing, preschool and kindergarten play areas, and athletic fencing.
- B. PVC coated No Climb Fence fabric, posts, rails, tension components and fittings for equipment enclosure.
- C. Excavation for post bases.
- D. Concrete anchorage for posts.

##### 1.03 RELATED WORK

- A. Section 02930: TOPSOILING and SODDING.
- B. Section 03300: CAST-IN-PLACE CONCRETE.

##### 1.04 WORK EXCLUDED

- A. Temporary Construction Fence.

##### 1.05 ERECTOR QUALIFICATIONS

- A. Minimum of two years of experience installing similar fencing.

##### 1.06 REFERENCES

- A. Chain Link Fence Manufacturers Institute (CLFMI) and ASTM F567 - Standard of chain link fence installation.
- B. ASTM A120 - Black and hot dip zinc coated (galvanized) welded and seamless steel pipe.
- C. ASTM A123 - Hardware (hot-galvanized coatings on products fabricated from rolled, pressed and forged steel shapes, bars, and strip).
- D. ASTM C94 - Ready-mixed concrete.

E. ASTM A491 - Aluminum coating of chain link fabric (steel core wire).

F. ASTM F668 - PVC coated steel chain link fabric, class 2B

#### 1.07 SHOP DRAWINGS AND PRODUCT DATA

A. Submit shop drawings and product data in accordance with Section 01340.

B. Clearly indicate plan layout, grid, spacing of components, accessories, fitments, and anchorage.

C. Submit manufacturer's installation instructions and procedures including standard details of fence and gate installation.

### **PART 2 - PRODUCTS**

#### 2.01 ACCEPTABLE MANUFACTURERS

A. Anchor Fence, Inc.

B. Sonco Fence, Inc.

C. Cyclone Fence

D. Allied Tube and Conduit (Fence Division)

E. Master Halco

F. Other domestic manufacturers meeting the requirements of this Section.

#### 2.02 MATERIALS

A. All Fencing

1. Framework: Thermally fused and adhered PVC or Polyolefin coated, sizes as indicated.

2. Mesh: Thermally fused PVC coated chain link fabric "Standard Industrial" "Tennis Court" or "No Climb" type as indicated.

#### 2.03 CONCRETE MIX

A. Concrete: ASTM C94, normal Portland Cement, 2000 psi at 28 days, 2 inch to 3 inch slump.

#### 2.04 FENCE COMPONENTS

- A. Gate Posts:
1. Posts for swing gates shall be of the following nominal sizes for single swing gates or one leaf each of double gates:
    - a. Gates up to 6' wide shall be 3.00" O. D.
    - b. Gates over 6' to 13' wide shall be 4.0" O. D. @ 9.11 pounds
    - c. Gates over 13' to 18' wide shall be 6.625" O. D. @ 18.97 pounds
    - d. Gates over 18' wide shall be 8.625" O. D. @ 28.55 pounds
- B. Top Rail and Bottom Rail:
1. Top and bottom rail for 72" and 120" fabric shall be 1.66" O. D.
  2. Top and bottom rail for 48" fabric shall be 1-5/8" O. D.
- C. Braces: Brace material shall be same as top rail.
- D. No Climb Fabric: Shall be as follows or as indicated on the Drawings.
1. 96 inches high: One piece of Polyolefin coated 9-gauge wire woven in a 5/8-inch chain link diamond mesh pattern. Top and bottom selvage shall have a knuckled finish. (Master Halco, Basis of design)
- E. Fabric: Shall be one or more of the following based upon fence height shown on the Drawings.
1. 48 inches high: One piece of 9-gauge wire woven in a 2-inch chain link diamond mesh pattern. Top and bottom selvage shall have a knuckled finish.
  2. 72 inches high: One piece of 9-gauge wire woven in a 2-inch chain link diamond mesh pattern. Top and bottom selvage shall have a knuckled finish.
  3. 120 inches high: One piece of 11-gauge wire woven in a 1 3/4-inch chain link diamond mesh pattern. Top and bottom selvage shall have knuckled finish.
- F. Fabric Connections:
1. Fabric shall be securely fastened to all terminal, corner, and gateposts by 1/4 x 3/4 inch tension bars with 11-gauge pressed steel bands.
  2. Fabric shall be securely fastened to all line posts with .062 by .375 self-locking line post fabric.

3. Fabric shall be securely fastened to top rail with .062 by .375 self-locking line post fabric.
- G. Line Posts: Shall be one or more of the following:
1. All intermediate line posts for 72-inch fabric shall be 1.9" O. D.
  2. All intermediate line posts for 120-inch fabric shall be 2.375" O. D.
  3. All intermediate line posts for 48-inch fabric shall be 2.00" O. D.
  4. All posts shall be equipped with tops designed to exclude moisture and to hold top rail.
- H. Terminal Posts:
1. All end, corner, and pull posts shall be 3.00" O. D. with tops designed to exclude moisture and to hold top rail.
- I. Pipe and Fittings:
1. All pipes shall be standard weight steel, A.S.A. Schedule 40, of domestic manufacture of sizes and weights specified, or Allied SS-40.
  2. Fittings: All fittings used in the complete fence assembly shall be of malleable cast iron or pressed steel.
- J. Gates:
1. Gates shall be of size and at locations as indicated on the Drawings, complete with latches, stops, keepers and hinges.
  2. Frames shall be 1.9" O. D. pipe per linear foot with heavy malleable iron or pressed steel corner fittings securely fastened to provide a rigid frame of ample strength free from sag and twist. Each frame shall be equipped with 3/8-inch diameter adjustable truss rods.
  3. Fabric, to match the fence, shall be installed in the frame by means of tension bars and hook bolted at intervals not exceeding 14 inches.
  4. Hinges shall be of bearing pattern, of adequate strength for gate, and with large bearing surfaces for fastening in position. The hinges shall not twist or turn under the action of the gate. The gates shall be capable of being opened and closed easily by one person and swing 180 degrees.
  5. Malleable iron latches for single-swing gates shall be guillotine-type designed to prevent the gate from opening in the wrong direction.



6. Locking device for double-swing gates shall consist of fulcrum-type latch, a center drop rod, a center gate stop, and two semi-automatic holdbacks (set in concrete).

## 2.05 FINISH

- A. Provide manufacturers standard "Black" PVC coating, thermally fused, ASTM class 2B.

## PART 3 - EXECUTION

### 3.01 GENERAL:

- A. Install line posts, corner posts, top rails, post caps, wire fabric and gates to provide a rigid structure for fence heights of 48", 72" or 120" as indicated on the Drawings. Note: Unless otherwise indicated on the Drawings, all perimeter site fencing shall be 6' high.

### 3.02 POST SETTINGS:

- A. All posts shall be of sufficient length to provide a minimum 36" setting into concrete footing. Top of footing shall be crowned in order to shed water.
- B. Footing diameters shall be as follows:
  1. Line posts: 10" minimum
  2. Terminal posts: 12" minimum
  3. Gate posts: a minimum of 3 times wider than the post diameter.
- C. Footings shall consist of 1-2-4 concrete mix.

### 3.03 TOP AND BOTTOM RAILS

- A. Provide top rail couplings approximately every 20 feet.
- B. Top rails shall pass through intermediate line post tops and shall form a continuous brace from end to end of each stretch of fence. Fasten to corner posts using heavy pressed steel connections.
- C. Bottom rails shall connect to line post using Boulevard clamp.

### 3.04 BRACES

- A. Brace material shall be installed midway between top rail and ground, and shall extend from corner, end, pull and gateposts to the first adjacent line post. Securely fasten to posts using heavy pressed steel connections. Truss from line post back to terminal or gateposts with 3/8" diameter rod and turnbuckle.

## 3.05 LINE POSTS

- A. All posts shall be evenly spaced, 10 feet on center maximum.

## 3.06 WIRE FABRIC

- A. Position bottom of fabric approximately 2" above finish grade with tension wire stretched tight between posts.
- B. Fasten fabric to top rail, line posts, braces, and bottom tension wire with ties spaced 14" on center maximum.
- C. Fasten fabric to top rail with ties spaced 24" on center maximum.
- D. Attach fabric to ends and corners with tension bars and bar clips.
- E. Stretch fabric between terminal posts, or at intervals of 100 feet maximum, whichever is the least dimension.

## 3.07 CLEAN UP

- A. Remove all trash, debris and excess materials associated with the work from the job site and dispose of legally.

END OF SECTION

**SECTION 02870**  
**SITE FURNISHINGS**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF WORK

- A. This Section includes provision and installation of bike racks and litter receptacles in quantities and locations as indicated on the Drawings.

1.03 REFERENCE STANDARDS

- A. Accessibility Requirements: Site furnishings shall be provided to conform to the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and State and Local Regulations. These requirements supersede Technical Specifications in this Section.
- B. Fairfax County Bicycle Parking Guidelines: latest edition.

1.04 SUBMITTALS

- A. Submittals shall be provided to the Architect for approval.
- 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. Shop drawings: Complete details of layout and assembly, showing member sizes and part identification, fasteners, anchors, and fittings.
- D. Selection Samples: Color selections shall be made from the manufacturer's full range of available standard colors. Provide samples, minimum size 3 inches by 5 inches representing actual product, color and patterns.
- E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- F. Manufacturer's warranties

## 1.05 DELIVERY STORAGE AND HANDLING

- A. Delivery: Deliver products to site in manufacturer's original, unopened containers and packaging. Upon delivery, examining packages immediately to ensure all products are complete and undamaged.

## 1.06 WARRANTY

- A. Limited warranty against defects in workmanship and materials for a period of five years on products consisting of a galvanized finish.

**PART 2 PRODUCTS**

## 2.01 BICYCLE RACKS

- A. Approved Manufactures
  - 1. Dero, Minneapolis, MN (612) 359 0689 ([www.dero.com](http://www.dero.com)) (Basis of Design)
  - 2. Pre-bid approved manufacturer in accordance with Section 01630.
- B. Bicycle Rack
  - 1. Model: Hoop Rack
  - 2. Materials: Steel
    - a. Pipe: 1.5" ASTM A 53 Schedule 40 (1.9" OD).
    - b. Finish: Hot dipped galvanized.
  - 3. Height: 35 inches (914 mm).
  - 4. Capacity: Coordinate capacity and number of racks per with contract drawings.
  - 5. Mounting: Surface mounted per manufacturer specifications.
  - 6. Distance Between Racks: Provide 36" minimum between racks.
  - 7. Wall Setback: Provide minimum 36" between wall and rack.

## 2.02 LITTER RECEPTACLES

### A. Approved Manufactures

1. Victor Stanley, Dunkirk, MD, (800) 368-2573, [www.victorstanley.com](http://www.victorstanley.com). (Basis of Design)
2. Pre-bid approved manufacturer in accordance with Section 01630.

### B. Litter receptacles

1. Victor Stanley, Inc. Model: NSDC-36 "Steelsites Series" Litter Receptacle.
  - a. Capacity: 36-gallon.
  - b. Litter receptacle: 3/8" x 1" vertical solid steel bars; 1/4" x 2" horizontal solid steel band; 3/8" x 3" steel support bars; leveling feet with a 3/8" diameter threaded steel shaft. Oil impregnated bronze bushings and stainless steel pivot pins for door movement, standard 3/8" solid steel latch assembly.
  - c. Lid: Standard formed convex riveted lid.
  - d. Liner: 36-gallon capacity high density plastic liner.
  - e. Mounting plate: Three anchor bolt holes.
  - f. Bottom plate cover.
  - g. Install per manufacturer's recommendation for surface mount.
  - h. Quantity: Locations to be as shown on Drawings.

## PART 3 EXECUTION

### 3.01 INSTALLATION, GENERAL

- A. General: Comply with manufacturer's instructions and recommendations for assembling and installing site furniture. Coordinate with installation of other work as required to ensure that each element of the work performs properly, and that combined elements are rigid and tight. Anchor site furniture items securely in supporting substrates, adequate to withstand loading pressures. Use stainless steel rods and nuts of size and quantity recommended by manufacturer placed in proper expansion fittings. Install site furniture units plumb and level. Install all items with movable or operable parts and components in completely operable condition.

### 3.02 CLEANING

- A. Protect products prior to installation by having them remain in the manufacturer's packaging and container. After completing site and street furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

END OF SECTION

## SECTION 02930

### TOPSOILING, SEEDING AND SODDING

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 through Division 16 Specification Sections, apply to the Work of this Section.

##### 1.02 RELATED WORK

- A. Earthwork: Section 02200
- B. Landscaping: Refer to Civil Drawings and Section 02950.
- C. Temporary Seeding for Erosion Control: Refer to Civil Drawings and Section 02100.

##### 1.03 REFERENCE STANDARDS

- A. Fairfax County Public Facilities Manual
- B. Virginia Sediment and Erosion Control Handbook

##### 1.04 AREAS TO BE SODDED

- A. All areas disturbed during construction that are to receive vegetative stabilization.

##### 1.05 QUALITY ASSURANCE

- A. All sod shall be transplanted within 24 hours from the time it is harvested, unless stacked at the project site in a manner approved by the Owner's Representative. Stacked sod shall be kept moist and protected from exposure to wind and sun. Any sod permitted to dry out shall be rejected.
- B. Plant sod only during periods of favorable weather when conditions are suitable. Do not place sod at any time temperature is below freezing. No frozen sod shall be used, and no seed or sod shall be placed on frozen, powder-dry or excessively wet soil.
- C. Certification of Grass Seed: For each grass seed monostand or mixture, provide information from seed Producer stating the botanical and common name, percentage by weight of each species, percentage of purity, germination, weed seed content, year of production and date of packaging.

- D. Soil amendments and rate of application shall be determined by laboratory test on soil.
1. Areas to be seeded or sodded shall have a soil pH range of 6.5 - 7.0. Contractor shall be responsible for ensuring correct soil pH.
  2. Test pH level in at least five equidistant locations on the site. Review with the Owner's Representative or Architect who will determine whether the average soil pH value is within acceptable range. If existing soil pH is adequate, no soil amendments are required.
  3. If average pH value is greater than 7.0, add a commercial grade sulfur at rate derived from lab test, over area to be seeded.
  4. If average soil pH value is less than 6.5, then agricultural limestone shall be applied at rate derived from lab test.

#### 1.06 SUBMITTALS

- A. Submit statement of certification from local nursery from which sod shall be obtained.
- B. Upon request, submit square yard of sod to project site for inspection by Architect and owner's representative.
- C. Submit certificates, signed by producer and contractor, stating that soil amendments and sod comply with this specification. Certificates to include the following:
1. Limestone: Type, percentage of calcium magnesium carbonates or oxides, and gradation.
  2. Fertilizer: Type and analysis.
- D. Submit copy of laboratory test results and soil amendment recommendations for review by the Architect and the Owner's Representative.

#### 1.07 DELIVERY, STORAGE AND HANDLING

- A. Sod: Harvest, deliver, store and handle sod in compliance with the requirements of TPI's "Specifications for Turfgrass Sod Materials," and "Specifications for Turfgrass Sod Transplanting and Installation" contained in the "Guidelines Specifications to Turfgrass Sodding".
- B. Seed: Deliver seed in original sealed, labeled and undamaged packaging.

#### 1.08 GUARANTEE, INSPECTION AND FINAL ACCEPTANCE

- A. Guarantee that at end of ninety days after sodding, a healthy first class lawn shall exist.
- B. Upon written request from Contractor, at least ten days before date of inspection, Owner or Architect will perform an inspection of sodded areas.
- C. After inspection, list of deficiencies or omissions requiring correction will be proposed. Items shall be corrected and are subject to same guarantee and final inspection until found acceptable. Be responsible for continued maintenance of that portion of the lawn, which, after ninety days, has not been accepted by Owner.
- D. Notwithstanding punch list items, Owner will certify in writing substantial completion of lawns and acceptance of work. Upon completion, reinspection of repairs or renewals necessary, Owner will assume responsibility for continued maintenance of lawn.

## **PART 2 - PRODUCTS**

### **2.01 TOPSOIL**

- A. Topsoil shall be a natural, friable, granular soil containing organic matter, uniform composition and texture, and free from clay subsoil, stones, weed plant root, sticks, gravel, trash or harmful chemicals. Obtain topsoil from project site stockpiles established during clearing operations. The project topsoil shall be amended to meet these specifications. Obtain additional topsoil required for landscape development from off-site sources and transport to the project site at no increase to contract sum. Obtain approval from Architect to supply topsoil from more than one site. Do not excavate or haul topsoil when wet or frozen.

### **2.02 SOIL AMENDMENTS**

- A. Limestone: Agricultural grade limestone ground to such fineness that at least 10% passes a 100-mesh sieve, 50% passing a 40-mesh sieve, and at least 90% passes a 20-mesh sieve.
- B. Sulfur: Commercial grade sulfur of equal grade, and quality as specified for limestone.
- C. Gypsum: Agricultural grade gypsum ground to such fineness that at least 10% passes a 100-mesh sieve, 50% passing a 40-mesh sieve, and at least 90% passes a 20-mesh sieve.

### **2.03 FERTILIZER**

- A. Fertilizer: Complete organic or inorganic fertilizer with percentages of nitrogen, phosphoric acid, potash, and trace elements determined by the soil test. Fertilizer



shall be delivered to the site in original unopened containers that bear manufacturer's guaranteed statement of analysis. Rate of application shall be determined by the soil test and/or grass product planting recommendations.

#### 2.04 SOD AND SEED

- A. Sod: State certified, nursery grown in nearby area, well rooted, free from disease, defects, insect infestation, or any unhealthy or abnormal condition, and free of weeds.
- B. Grass Seed: Fresh, clean, dry, new crop seed complying with AOSA "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances. Germination: not less than 95%. Seed purity: not less than 85% pure seed and not more than 0.5% weed seed.
- C. Sod and Seed Composition:
  - 1. Tall Fescue (Drought Tolerant, Full Sun Mixture)
    - a. Certified Tall Fescue Cultivars, a mixture of at least two different types - 95%
    - b. Certified Kentucky Bluegrass - 5%
  - 2. Medium Quality Bermuda Grass (if specified on contract Drawings)
    - a. Mohawk Advanced Synthetic Turf-Type
    - b. La Prima Synthetic Turf-Type
- D. Submit statement giving locations of property from which sod is to be obtained and submit square yard sample of sod to site if requested.

### PART 3 - EXECUTION

#### 3.01 FINISH GRADE

- A. After rough grading has been completed and site cleared of construction debris, cover areas disturbed by construction or rough grade with minimum four inches of topsoil over earth to provide finish grade.
- B. Final grades are indicated. Do not allow soil to pond. Firm topsoil by rolling to prevent washing and sinking. Degree of finish shall be that ordinarily obtained with blade grader or scraper. Finish surface to within 0.10 foot above or below established grade elevations indicated.
- C. Surface soil of final grade shall be hand raked prior to topsoil placement.

## 3.02 TOPSOIL PLACEMENT

- A. Topsoil shall be placed at a 4" depth over all areas to be sodded.
- B. All subgrade areas to be sodded shall be loosened by discing or scarifying to a depth of no less than 4".
- C. All areas to be sodded shall be free from roots, brush, stones, trash, etc. larger than 0.5" in diameter or length.
- D. All proposed grades must be maintained after topsoil placement.

## 3.03 APPLICATION OF SOIL AMENDMENTS

- A. Soil testing shall be made to determine the exact requirements of lime and fertilizer. If soil amendments are required, apply at rates specified. Blend topsoil mix to subgrade and mix soil amendments uniformly into topsoil by tilling, disking or harrowing to five inch depth. Adjacent to existing trees, adjust depth to avoid disturbances of tree roots. Tests shall be performed by a state laboratory or recognized commercial laboratory.

## 3.04 FERTILIZING/LIME:

- A. Fertilizer
  - 1. All Fertilizer shall be uniform in composition, free flowing and suitable for application with approved equipment.
  - 2. Application rates shall be determined by testing.
  - 3. Fertilizer shall be evenly distributed over the entire area to be sodded.
- B. Lime
  - 1. All Lime material shall be ground limestone (hydrated or burnt lime may be substituted) which contains at least 50% total oxides (calcium plus magnesium oxide).
  - 2. Application rates shall be determined by testing.
  - 3. Lime shall be evenly distributed over the entire area to be sodded.
- C. All Fertilizer and lime shall be uniformly mixed into the top 4" of soil by discing, harrowing or other approved methods. Any undulations or irregularities in the surface resulting from fertilizing, tilling or other causes shall be leveled prior to sodding.

## 3.05 SODDING

- A. Sod shall be laid smooth, edge to edge, with staggered joints and immediately pressed firmly into contact with sod bed by rolling to eliminate air pockets. True and even surface shall be provided to ensure knitting without displacement of sod or deformation of surfaces of sodded areas. In ditches or swales, sod shall be placed with longer dimension perpendicular to flow of water in ditch. On slopes of 1:4 and greater, the sod shall be laid with staggered joints. Sod shall be secured by biodegradable stakes or other approved method.
- B. Following compaction, screened topsoil of good quality shall be used to fill cracks, and excess soil worked into grass with rakes or other suitable equipment. Grass shall not be smothered with excess fill soil. Exposed edges of sod shall be buried flush with adjacent soil.
- C. Sod shall not be laid on soil surface that are frozen. During High temperature, the soil shall be lightly irrigated immediately prior to laying the sod.

## 3.06 SEEDING

- A. Sow seed with spreader or seeding machine. Do not use wet seed or seed that exhibits mold or is otherwise damaged. Broadcast seed evenly by sowing in two directions at right angles to each other. Seed only when wind is calm. Sow Tall Fescue seed at the rate of 5 to 8 lb. per 1000 sq. ft. and Bermuda grass seed at the rate of 3 to 5 lb. per 1000 sq. ft.

## 3.07 HYDROSEEDING

- A. Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until homogeneous slurry is obtained.
- B. Mix slurry with specified tackifier and apply uniformly.
- C. Apply mulch at rate required to obtain specified seed sowing rate.

## 3.08 MAINTENANCE

- A. Ensure the establishment of a healthy, first class lawn. Be responsible for all maintenance, protection, and repair until Owner accepts planted area. Include watering, rolling, fertilizing and mowing.
- B. Maintenance and protection of all seeded and sodded areas shall continue until Owner accepts lawn. Barriers, sign, and/or flags shall be used on established pedestrian circulation ways as determined by Owner to indicate areas where trespassing is not allowed.

- C. During the maintenance period repair or re-work washouts, dry areas, dead areas or erosion at no additional cost to Owner. Repair damage by vandalism at no additional cost to Owner.

END OF SECTION

**SECTION 02950**  
**LANDSCAPE WORK**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 through Division 16 Specification Sections, apply to the Work of this Section.

1.02 RELATED WORK

- A. Earthwork: Section 02200
- B. Topsoiling, Seeding and Sodding: Refer to Civil Drawings and Section 02930.

1.03 REFERENCE STANDARDS

- A. Fairfax County Public Facilities Manual
- B. Virginia Sediment and Erosion Control Handbook

1.04 JOB CONDITIONS:

- A. Prior to beginning work, the Contractor is required to schedule and attend an on-site meeting with the Owner, Architect, and Fairfax County Urban Forestry Office, in order to verify site conditions and scope of work.
- B. Proceed with and complete landscape work as rapidly as portions of site become available, working in cooperation with the general contractor and within seasonal limitations for each kind of landscape work required.
- C. Utilities: Determine location of underground utilities and perform work in a manner that will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is authorized.
- D. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify architect or Owner's Representative before planting.
- E. Coordination with Lawns: Refer to Section 02930. Plant trees and shrubs after final grades are established and prior to seeding and sodding. If planting of trees and shrubs occurs after seeding and sodding, protect lawn areas and promptly repair damage to lawns resulting from planting operations.
- F. Extent of landscape development work is shown on drawings and in schedules, and specified herein.

- G. The work shall include, but not necessarily be limited to the following:
1. Disposal of unused excavated material from planting excavations only.
  2. Furnishing, protecting and planting all trees and shrubs of types and sizes specified.
  3. Pruning, trimming, feeding, and mulching trees where trees are marked to be saved.
  4. Mulching new planting stock.
  5. Wrapping and staking new planting stock.
  6. Watering new planting stock.
  7. Furnishing and installing portable drip irrigation bags at each new tree.
- H. Subgrade elevations: Excavation, filling and grading required to establish elevations shown on drawings are specified elsewhere. Refer to Earthwork, Section 02200.

#### 1.05 QUALITY ASSURANCE

- A. Subcontract landscape work to a single firm specializing in landscape work and with a record of satisfactory performance on similar projects.
- B. Quality Control:
1. Comply with sizing and grading standards of the latest edition of "American Standard for Nursery Stock". A plant shall be dimensioned as it stands in its natural position.
  2. All plants shall be nursery grown under climatic conditions similar to those in locality of the project for a minimum of 2 years.
  3. Stock furnished shall be at least the minimum size indicated. Provide plants indicated with a measurement range so that only a maximum of 50 percent are of the minimum size indicated and 50 percent are of the maximum size indicated.
  4. Plants will be inspected and approved at the place of installation, for compliance with specification requirements for quality, size and type of specimen.
- C. Maintenance Instructions: Submit typewritten instructions to be used by Owner for maintenance of landscape work for one full year after termination of

maintenance period. Submit prior to expiration of required maintenance period(s).

#### 1.06 DELIVERY, STORAGE AND HANDLING

- A. Packaged Materials: Deliver materials in original packaging showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery and storage on site.
- B. Trees and Shrubs: Provide freshly dug trees and shrubs. Do not prune prior to delivery. Do not bend or bind-tie trees or shrubs in such manner as to damage bark, break branches or destroy natural shape. Provide protective covering during delivery.
- C. Deliver trees and shrubs after preparation for planting has been completed, and plant immediately. If planting is delayed more than 6 hours after delivery, set trees and shrubs in shade, protect from weather extremes and mechanical damage, and keep rootball moist.

#### 1.07 SPECIAL PROJECT WARRANTY:

- A. It shall be the Contractor's responsibility to water, fertilize and otherwise maintain plant materials in healthy condition, free of stress and insect infestation, until such time as the landscaping is formally accepted in writing by the County Urban Forest Office. The standard one-year warranty shall not commence until such formal notice is given by the Inspector.
- B. Warranty new trees and shrubs for a period of one year after date of Inspector's acceptance, against defects including death and unsatisfactory growth, except for defects resulting from neglect by Owner, abuse or damage by others, or unusual phenomena or incidents which are beyond Landscape Installer's control.
- C. Remove and replace unsatisfactory trees or plants or those found to be dead or in unhealthy condition during warranty period. Make replacements during growth season following end of warranty period. Replace in kind and size specified and plant in accordance with this Section.

#### 1.08 SUBMITTALS

- A. Submit manufacturer's catalog information and installation instructions for portable drip irrigation bags for new trees.

**PART 2 - MATERIALS**

## 2.01 TOPSOIL

- A. Topsoil stockpiled for re-use shall be used in areas receiving seed or sod. Topsoil for planting shall be supplied from off-site sources by this Contractor.
- B. Provide new topsoil which is fertile, friable, natural loam, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, stones larger than 2" in any dimension, and other extraneous or toxic matter harmful to plant growth. Determine pH of topsoil and add amendments as required.
- C. Commercial Fertilizer: Complete fertilizer with some elements derived from organic sources and containing percentages of available plant nutrients recommended for each type of planting and of proper pH for each type of specimen (refer to Section 02930).

## 2.02 PLANT MATERIALS

- A. Plant materials shall be classified as per "American Standard for Nursery Stock", as adopted by the American Association of Nurserymen. Plant materials not meeting this standard shall be rejected.
  - 1. Conform to requirements of the plant list.
  - 2. All plant materials shall be nursery growth stock.
  - 3. Trees shall be well branched, with full crown.
  - 4. Each plant shall be free from disease, insect infestation, and dead branches.
  - 5. Each plant shall be balled and burlapped (B&B), with rootball fully intact.
  - 6. Substitutions may be made only after submission of evidence substantiating to the Architect's and Owner's satisfaction, non-availability of specified plant items and only if approved by the County Arborist's Office.
  - 7. Substitutions may be made only with Architect or Owner's approval, at same price as unavailable contract item or at lower, approved price with a credit provided.
- B. Planting Soil Mix: 3 parts by volume topsoil, 1 part by volume peat moss.
- C. Mulch: Shredded hardwood or pine bark.



- D. Deciduous Tree Wrapping: Approved tree wrapping paper 4 inch width.
- E. Stakes, guy wire and tubing: Of kind and size per drawings for proper support of specimen.

### 2.03 PORTABLE DRIP IRRIGATION BAGS

- A. Portable drip irrigation bags shall be UV treated polyethylene bags, reinforced with nylon webbing, with nominal capacity of 20 gallons. Bags shall be designed to be connected together to form larger units for larger trees, if needed. Bags shall be designed to be easily filled with a standard garden hose, and to release water into the root ball of the tree over sufficient time to prevent runoff. Drip irrigation bags shall be "Tregator" bags, as manufactured by Spectrum Products, Inc., Raleigh, North Carolina, 1-866-tregator (web page tregator.com), or approved equal.

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations and outline areas and secure Architect's and Owner's acceptance before start of planting work. Make minor adjustments as may be requested.
- B. Topsoil Placement: See Section 02930
- C. Preparation for Planting:
  - 1. Planting hole: Prepare in accordance with drawings and dispose of soil removed from hole.
  - 2. Tree planting: Plants shall be set plumb, planted at same depth that plants grew in nursery.
  - 3. After placing plant in hole, planting soil mix shall be gently but firmly tamped and sufficiently watered to ensure soil contact around all roots.
  - 4. Earth saucers or water basins shall be at least four (4) inches deep with diameter equal to that of plant ball.
  - 5. Water plants thoroughly during and immediately after planting.
  - 6. Mulch to cover saucer area of individual plants.
  - 7. Wrapping shall cover entire trunk to height of first branch.

8. Guy with stake locations and depth per drawings, with a minimum of three stakes per tree.
9. Prune shortly after planting only when deemed necessary by Architect or Owner's Representative to remove broken and bruised branches.
10. Provide and install portable drip irrigation bags at each new tree. Provide single unit bags (20 gallons) for trees with 1" to 4" trunks, and combine bags to form a 50 gallon set for trees with 4" to 8" trunks. Install in accordance with manufacturer's instructions. Fill the bags and begin scheduled maintenance.

### 3.02 CLEANUP AND PROTECTION

- A. During landscape work, keep adjacent paved areas clean, and work area in an orderly condition.
- B. Protect landscape work and materials from damage due to landscape operations, operations by other contractors and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape work as directed.

### 3.03 INSPECTION AND ACCEPTANCE

- A. When landscape work described in this section is completed, the Architect and Owner's Representative will make an inspection to determine acceptability.
- B. Where inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until reinspected by Architect and Owner's representative and found to be acceptable. Remove rejected plants and materials from project site, and replace with healthy specimens.
- C. It shall be the Contractor's responsibility to diligently pursue approval of the landscaping from the Fairfax County Urban Forestry Office, and to correct punch list inspection items, prior to Owners occupancy of the new construction.
- D. It shall be the Contractor's responsibility to maintain and provide irrigation to all plant material until such time the work has been accepted by the owner.
- E. Remove all guy wires and stakes between six to twelve months after landscaping installation.

END OF SECTION