DIVISION 1-GENERAL REQUIREMENTS

SECTION 01010 - SUMMARY OF WORK

PART 1 – GENERAL

1.01 WORK SUMMARY

A. Work generally consists of, but is not limited to, the site improvements necessary for the development of approximately 3.7 acres at the northwest corner of Chestnut Grove Cemetery, located at 831 Dranesville Road.

B. The Following is a brief, but not all-inclusive, description of the Work.

1. Clear and grub approximately 3.7 acres within the designated limits of disturbance, including removal and disposal of trees, stumps, brush, vegetation, roots, debris, unsuitable materials, and other obstructions.

   Perform clearing and removal outside the designated limits where specifically indicated on the Plans or otherwise required by the Contract Documents.

   All clearing and grubbing shall be performed in accordance with applicable environmental and regulatory requirements. Tree cutting shall comply with the requirements for protection of the Northern Long-Eared Bat and the restrictions established in the Special Conditions.

2. Perform all excavation, embankment, grading, filling, hauling, stockpiling, disposal, topsoil placement, moisture conditioning, compaction, and related earthwork necessary to establish the proposed burial areas, access roads, drainage facilities, landscape areas, and other improvements shown on the Plans.

   Earthwork and engineered fill shall be performed in accordance with the recommendations of the Geotechnical Report.

   Unless otherwise specified, engineered fill, including fill slopes, shall be placed in controlled lifts and compacted to a minimum of 95 percent of maximum dry density as determined by the applicable ASTM test method.

   The Contractor shall furnish suitable fill materials and shall provide all moisture conditioning, compaction, testing, and other measures necessary to achieve the specified requirements.

3. Construct an initial burial area capable of accommodating at least 100 burial plots at the location generally shown on the Plans.

   The Work shall include all clearing, grubbing, excavation, grading, filling, compaction, drainage, topsoil placement, stabilization, and related improvements necessary to provide suitable and stable areas for burial operations.

The Contractor shall coordinate the construction and completion of the initial burial area with the Owner and shall sequence the Work to make the area available for cemetery use as early as practicable.

4. Construct storm drainage piping of various diameters, together with all associated structures, inlets, outlets, connections, fittings, bedding, backfill, testing, and appurtenances shown on the Plans.

   Provide all excavation, shoring, dewatering, pipe installation, backfill, compaction, restoration, and incidental Work necessary for a complete and functional storm drainage system.

5. Construct the stormwater management facilities shown on the Plans, including all required excavation, embankment, grading, drainage structures, piping, outlet structures, stabilization, erosion and sediment control measures, and related improvements.

   Complete all facilities in accordance with the Plans, Specifications, applicable permits, and requirements of the authorities having jurisdiction.

6. Construct the proposed paved cemetery access roads, including the proposed cul-de-sac, in accordance with the Plans and Specifications.

   The Work shall include excavation, subgrade preparation, aggregate base, pavement, drainage, curbing or edge treatments, transitions, tie-ins, and all associated roadway improvements.

   The Contractor shall provide suitable subgrade preparation and compaction and shall construct pavement sections in accordance with the Plans and applicable specifications.

7. Design and construct three (3) uncovered landscape material storage bins as shown on the Plans.

   The Contractor shall provide complete design, layout, materials, foundations, structural components, drainage, and construction necessary to provide complete and functional storage bins.

   All design and construction shall comply with the Contract Documents and applicable codes and requirements.

8. Furnish and install all trees, shrubs, groundcover, and other landscape plantings shown on the approved Plans.

   The Work shall include soil preparation, planting, staking or stabilization, watering, mulching, maintenance, replacement of unsuccessful plantings, and other Work necessary for proper establishment.

9. Furnish, install, maintain, inspect, repair, and remove erosion and sediment control measures required by the Contract Documents and applicable permits.

Erosion and sediment control measures shall be installed and stabilized prior to commencement of associated clearing, grading, and earthwork activities.

The Contractor shall maintain effective erosion and sediment controls throughout construction and shall promptly repair or replace damaged or ineffective measures.

10. Coordinate all Work with existing utilities and facilities. Protect existing utilities, structures, roads, landscaping, cemetery facilities, monuments, graves, and other improvements designated to remain.

    The Contractor shall verify existing conditions and shall coordinate utility locations and connections prior to excavation or construction activities that may affect existing facilities.

11. Restore all areas disturbed by construction that are not incorporated into permanent improvements.

    Restoration shall include grading, topsoil placement, seeding, landscaping, stabilization, removal of temporary facilities, and other Work necessary to provide a complete and acceptable finished site.

12. Provide all required testing, inspections, certifications, and documentation necessary to demonstrate compliance with the Contract Documents.

    The Contractor shall coordinate required inspections with the Owner and applicable authorities and shall provide sufficient advance notice to allow inspections to be scheduled without delaying the Work.

13. Furnish and perform all incidental Work necessary for complete execution of the project, whether specifically identified in the Contract Documents or reasonably necessary to construct and deliver the improvements shown on the Plans.

    Such Work includes, but is not limited to, temporary facilities, construction access, protection of existing improvements, traffic and pedestrian control, temporary drainage, dewatering, site cleanup, removal of construction debris, final cleanup, and restoration.

14. The contractor’s baseline schedule must account for long lead times, as extended durations of inactivity will not be acceptable.

15. Provide all other items and appurtenances as indicated in the Contract Documents.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 015600

TEMPORARY BARRICADRES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work in this section.

The latest edition of the Virginia Work Zone Area Protection Manual (WPAM)
The latest edition of the Manual on Uniform Traffic Control Devices (MUTCD)
The latest edition of the Northern Virginia Regional Park Authority (NVRPA)

1.2 DESCRIPTION OF WORK

This section shall include items indicated on the plans that relate to the temporary barricades, pedestrian and patron controls and all non-vehicular temporary controls to assist in the navigation around the work zone

1.3 QUALITY ASSURANCE

Comply with the latest edition of the Virginia Work Area Protection Manual: Standards and Guidelines for Temporary Traffic Control, Manual on Traffic Control Devices and all Federal Regulations and Laws.

1.4 SUBMITTALS

Within 30 calendar days after receiving NOTICE OF AWARD, CONTRACTOR shall submit to the Department of Public Works a schedule for maintenance of traffic control plan.

1.5 SITE CONDITIONS

Comply with the submitted Maintenance of Traffic Plan (MOT) and Work Zone Safety Plan (submitted and approved prior to permits issued). Necessary changes to controls may be made by Town Staff as necessary.

PART 2 – PRODUCTS

Comply with VDOT approved manufacturer specifications.

PART 3 – EXECUTION

Prior to beginning construction and preparing the work zone site, necessary barricades shall be placed along the W&OD trail and along the right-of-way. Upon the barricade placement, the superintendent of the job shall inspect the location of the barricades.

Traffic controls shall include barrels that are lighted along the trail for detours of pedestrians and non-motorized vehicles. Traffic control for the trail shall be in conformance with the Northern Virginia Regional Park Authority (NVRPA) Standards and Specifications.

Additional follow up placement and replacement of the barricades may be necessary if the environmental conditions change the construction zone changes and/or any unforeseen changes.

PART 4 – MEASUREMENT AND PAYMENT

Devices shall be included as part of the lump sum.

END OF SECTION

SECTION 015639

TEMPORARY TREE AND PLANT PROTECTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work in this section.

1.2 DESCRIPTION OF WORK

This section shall include items indicated on the plans that relate to the temporary tree and plant protection around the work zone.

1.3 QUALITY ASSURANCE

Comply with the latest editions of the Virginia Erosion and Sediment Control Regulations, Fairfax County Public Facilities Manual, Town of Herndon Regulations and all other Federal Regulations and Laws. No damage to trees and plants located in these protected areas shall occur.

1.4 SUBMITTALS

N/A

1.5 SITE CONDITIONS

A. Brush Barrier – Std. & Spec 3.06

B. Tree Protection - Std. & Spec. III-393

C. Soil Stabilization & Matting – Std. & Spec. III-393

PART 2 – PRODUCTS

Comply with approved Virginia Erosion and Sediment Control manufacturer specifications and per the construction plans.

PART 3 – EXECUTION

Prior to beginning construction and preparing the work zone site, necessary tree and plant protection shall be placed. Upon the tree and plant protection placement, the superintendent of the job shall inspect the location of the protection.

Periodic maintenance on controls shall occur on a weekly basis and/or as required to keep the protection devices operating correctly.

Additional follow up placement and replacement of the tree and plant protection may be necessary if the environmental conditions change the construction zone changes and/or any unforeseen changes.

PART 4 – MEASUREMENT AND PAYMENT

Devices shall be included as part of the lump sum.

END OF SECTION

SECTION 015713

TEMPORARY EROSION AND SEDIMENT CONTROLS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work in this section.

1.2 DESCRIPTION OF WORK

This section shall include items indicated on the plans that relate to the temporary erosion and sediment controls around the work zone.

1.3 QUALITY ASSURANCE

Comply with the latest editions of the Virginia Erosion and Sediment Control Regulations and all other Federal, State, and Local Regulations and Laws.

The implementation of the ESPC measures and the construction, performance monitoring, maintenance, replacement, and upgrading of the ESPC measures are the responsibility of the Contractor until all construction is completed and accepted and vegetation/landscaping is established.

1.4 SUBMITTALS

N/A

1.5 SITE CONDITIONS:

The following erosion and sediment controls are recommended:

A. Inlet Protection - Std. & Spec. 3.07

B. Temporary Soil Stabilization – Std. & Spec. 3.31

1. Temporarily stabilize all areas, not permanently constructed upon within 7 calendar days, after completion of clearing and earthwork operations.

C. Permanent Soil Stabilization – Std. & Spec. 3.32

PART 2 – PRODUCTS

All materials shall comply with the Virginia Erosion and Sediment Control Handbook, latest edition. Additional erosion and sediment controls may be required to accommodate field conditions during construction. CONTRACTOR shall accommodate modifications to the erosion and sediment controls as necessary, at no additional cost to the contract.

PART 3 – EXECUTION

3.1 SEQUENCING

A. Install inlet protection on existing structures, silt fence & perimeter controls, and tree and plant protection before beginning any construction activities.

B. Install temporary seeding as required, in accordance with Virginia E & S Std. & Spec. 3.31

C. Install permanent soil stabilization as required, and in accordance with Section 02900.

3.2 MAINTENANCE:

A. Maintain soil erosion and sediment controls and tree protection devices, until authorized by the Town of Herndon to remove the controls, at no increase to the Contract Sum.

B. Maintain adjoining streets in a clean and mud-free condition. Maintain project area in a dust-free condition.

C. Maintain devices as directed in the Virginia Erosion and Sediment Control Handbook, latest edition.

3.3 REMOVAL

A. General

1. Obtain written authorization from the Town of Herndon Erosion Control Inspector before removing soil erosion and sediment controls.
2. Grade areas affected by removal operations to existing or finish grades indicated, and seed and mulch.

PART 4 - MEASUREMENT AND PAYMENT:

Devices shall be included as part of the lump sum.

END OF SECTION

DIVISION 1-GENERAL REQUIREMENTS

SECTION 015723 - STORMWATER POLLUTION PREVENTION AND CONSTRUCTION STORMWATER PERMIT COMPLIANCE

1. GENERAL REQUIREMENTS

The Owner has included the project Stormwater Pollution Prevention Plan (SWPPP), prepared as part of the project design, in the Contract Documents. The Contractor shall review the SWPPP and all applicable erosion and sediment control plans, stormwater management plans, permit conditions, and related environmental requirements before commencing construction.

The Contractor shall be responsible for implementing, maintaining, inspecting, documenting, and updating the SWPPP as required by the Contract Documents and applicable federal, Commonwealth of Virginia, and local regulations.

2. GENERAL VPDES PERMIT COVERAGE

The Contractor shall be responsible for obtaining coverage under the applicable Virginia Department of Environmental Quality (DEQ) General VPDES Permit for Discharges of Stormwater from Construction Activities, including submission of the required registration statement and supporting documentation to the appropriate Virginia Stormwater Management Program (VSMP) authority or DEQ, as applicable.

Before commencing any land-disturbing activity requiring permit coverage, the Contractor shall provide the Owner with documentation demonstrating that the required permit coverage has been obtained and accepted. The Contractor shall comply with all applicable permit conditions for which it is the responsible operator and shall maintain such coverage for the duration of its regulated construction activities, until properly terminated or transferred in accordance with applicable requirements.

The Contractor shall coordinate with the Owner and the Owner's designated representative to establish the appropriate permittee/operator arrangement and complete any required permit application, transfer, modification, or other regulatory documentation. No transfer or change of permit responsibility shall be considered effective solely by execution of the construction Contract.

3. SWPPP IMPLEMENTATION AND MAINTENANCE

The Contractor shall maintain a current copy of the project SWPPP, the applicable General VPDES Permit, the permit registration and coverage documentation, and all required inspection and corrective-action records at the construction site or at another location permitted by applicable regulations.

The Contractor shall review the design SWPPP and revise or supplement it as necessary to reflect actual construction activities, sequencing, site conditions, pollutant sources, temporary facilities, and changes in erosion and sediment controls. All revisions shall comply with

applicable permit requirements and shall be coordinated with the Owner and the appropriate regulatory authority when required.

The Contractor shall not implement a material change to the approved erosion and sediment control or stormwater management measures without obtaining the required review and approval.

4. INSPECTIONS, DAILY LOGS, AND CORRECTIVE ACTIONS

The Contractor shall designate qualified personnel to perform the inspections required by the applicable General VPDES Permit and the Contract Documents. Inspections shall be performed at the frequency and in the manner prescribed by the applicable permit and shall be documented in the SWPPP inspection records.

In addition, the Contractor shall maintain a daily construction stormwater log documenting, at a minimum, construction activities affecting stormwater controls, significant rainfall or runoff events when relevant, the condition of erosion and sediment controls, deficiencies observed, corrective actions taken, and any other information required by the Owner or applicable permit.

The Contractor shall promptly correct deficiencies in erosion and sediment controls and implement corrective actions within the timeframes required by the applicable permit. Inspection reports, daily logs, corrective-action records, SWPPP revisions, and other required documentation shall be made available to the Owner and regulatory authorities upon request.

5. COOPERATION AND CLOSEOUT

The Contractor shall cooperate with the Owner, the Owner's designated representative, the VSMP authority, and DEQ in all matters relating to construction stormwater compliance. The Contractor shall promptly notify the Owner of any notice of violation, inspection finding, discharge incident, permit noncompliance, or other material stormwater compliance issue relating to the Work.

Before final acceptance, the Contractor shall submit to the Owner copies of the final SWPPP, required inspection and daily log records, corrective-action documentation, permit correspondence, and any other required closeout documents. The Contractor shall complete all required permit termination or transfer documentation for which it is responsible and shall coordinate such actions with the Owner. Permit termination shall not occur until the applicable regulatory requirements have been satisfied and the appropriate authority has accepted the termination, where required.

6. COST OF COMPLIANCE

The Contractor shall include in its Contract Price all labor, materials, equipment, administrative effort, inspections, documentation, permit application and maintenance fees, and other costs necessary to fulfill its obligations under this Section, except for costs expressly identified elsewhere in the Contract Documents as the Owner's responsibility.

Failure to comply with this Section shall constitute a failure to perform the Contract requirements and shall be subject to the applicable Contract remedies, without limiting any independent regulatory obligations or liabilities imposed by law.

SECTION 024100

DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work in this section.

1.2 DESCRIPTION OF WORK

Contractor shall demolish, remove and dispose offsite at his expense, the following: existing asphalt pavement and concrete; existing driveway aprons; existing curb and gutter; existing sidewalk; and other demolished items, all to the extent shown on the contract drawings. Items to be removed and replaced or relocated shall be protected and stored by Contractor during construction.

1.3 QUALITY ASSURANCE

Perform demolition work in compliance with applicable requirements of Town of Herndon and Virginia Department of Transportation Road and Bridge Specifications (VDOT Specifications).

1.4 SUBMITTALS

Within 30 calendar days after receiving NOTICE OF AWARD, CONTRACTOR shall submit to the Department of Public Works a schedule for demolition and relocation work.

1.5 EXISTING CONDITIONS

A. Conduct demolition to minimize interference with adjacent structures, building areas, traffic on adjacent streets and work by others.

B. Provide, erect, and maintain temporary barriers, security devices, and tree protection.

C. Conduct operations with minimum interference to public or private thoroughfares. Maintain protected egress and access to residences/businesses at all times.

D. Do not close or obstruct roadways, driveways, trails or sidewalks without permits.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 PREPARATION

A. Notify adjacent property owners of work which may affect their property or could cause potential noise or disruption.

B. Prevent movement or settlement of adjacent structures. Provide bracing and shoring.

C. Protect existing plant life and structures.

D. Protect existing items which are not indicated to be removed.

3.2 EXECUTION

A. Remove existing asphalt pavement as required to install proposed water systems as shown on the plans, and as required for the reconstruction of the roadway.

B. Demolish indicated components in an orderly and careful manner, as shown on the plans.

C. Cease operations and notify the DPW immediately if adjacent structures appear to be in danger. Do not resume operations until corrective measures have been taken.

D. Backfill excavations, open pits and holes that are a result of demolition. Use soil types and compact as specified in Section 310100.

E. Rough grade and compact areas affected by demolition to maintain site grades and contours.

3.3 EXECUTION - SELECTIVE DEMOLITION

A. Demolish and remove components in an orderly and careful manner.

3.4 CLEAN UP

A. Remove demolished materials from site as work progresses.

B. Upon completion of work, leave areas in clean condition.

PART 4 - MEASUREMENT AND PAYMENT

A. Demolition work shall be included as part of the lump sum.

END OF SECTION

SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.2 RELATED DOCUMENTS

Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work in this section.

1.3 DESCRIPTION OF WORK

A. Contractor shall place cast-in place concrete as indicated per the construction plans and as denoted in the General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work in this section.

B. Concrete shall be 4000 psi strength in all applications

1.4 QUALITY ASSURANCE

A. Perform demolition work in compliance with applicable requirements of the latest edition of the Virginia Department of Transportation Road and Bridge Specifications (VDOT Specifications), Sections 217, Section 223, and Section 502

B. Perform demolition work in compliance with applicable requirements of the latest edition of the Virginia Department of Transportation Road and Bridge Specifications (VDOT Specifications), Volume I and II.

C. Perform demolition work in compliance with applicable requirements of the latest edition of ACI 301

D. Testing – CONTRACTOR shall employ, at no additional cost to the Town, an adequate geotechnical testing company to perform acceptance tests, including but not limited to minimum compressive strength (28 day cylinder break for regular portland cement, 7 day cylinder break for high-early cement), maximum water-cement ratio, and air content. Geotechnical field inspections and testing shall be conducted during concrete placement operations, at frequencies and intervals specified in the contract documents. Selected geotechnical company shall be acceptable to the Department of Public Works. In accordance with General Terms Section 5.14.4, the CONTRACTOR shall pay for all inspections, tests and certifications which the Contract specifically requires him to perform or pay. The CONTRACTOR is hereby specifically required to obtain and pay for said testing services.

1.5 SUBMITTALS

A. The CONTRACTOR shall provide a design mixture for the concrete (from the plant)

that is within the specifications of Virginia Department of Transportation Road and Bridge Specifications (VDOT Specifications), prior to the pour of the concrete.

B. The CONTRACTOR shall provide shop drawings and/or product data sheets for reinforcing that is to be placed within the concrete. This information is not limited to, but can include, detail fabrication, bending, placement of reinforcement, mechanical conditions, supports, etc.

C. Material Certificates – Provide copies of material certificates signed by material producer and contractor, certifying that each material item complies with, or exceeds, specified requirements.

D. Field reports for acceptance testing in accordance with ASTM C 172, ASTM C 143, ASTM C 31, ASTM C 39, and ASTM D 231, except that certificates, signed by the concrete producer and CONTRACTOR may be submitted in lieu of material testing for air content and water content, when acceptable by Owner.

PART 2 - PRODUCTS

A. Materials used under this section shall conform to VDOT Road and Bridge Specifications Section 217, Section 223, and Section 502.

B. All concrete material shall be ready-mix, or from mobile production plants, as permitted in VDOT Specification Section 217. Hand mixing and small batch mixing on job site will not be accepted.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Verify that subgrade, granular subbase, or surface areas are ready to support concrete placement. Compaction testing shall be performed in accordance with Section 02200.

B. Moisten surface to minimize water absorption from new concrete.

C. Verify proper placement of forms or guides to ensure uniform installation of new concrete

D. Install reinforcing materials and expansion materials as required

3.2 INSTALLATION OF CONCRETE

A. Method of execution under this section shall conform to VDOT Road and Bridge Standard Specification, Sections 302 for cast-in-place storm drain structures, Section 316 for driveway aprons, Section 502 for Curb and Gutter, and Section 504 for sidewalk.

B. Do not allow concrete to drop freely from heights greater than 3 feet for exposed

concrete and not greater than 5 feet for unexposed work (buried work). Concrete shall not be placed on frost, mud, loose, unsound, or other detrimental surfaces.

C. Contractor shall ensure that excess concrete does not splash or run onto adjoining property. Any excess spillage shall be cleaned up promptly and properly disposed of.

D. Contractor shall ensure that concrete trucks do not wash excess concrete from chutes or delivery equipment into the public right-of-way or onto private property. Contractor shall provide an adequate area for the cleaning of concrete trucks, and shall remove any excess concrete as necessary and dispose of properly.

PART 4 - MEASUREMENT AND PAYMENT

Cast-In-Place Concrete shall be included as part of the lump sum for each of the bid items, as appropriate.

END OF SECTION

SECTION 033100

CONCRETE FORMS AND FORMWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work in this section.

1.2 DESCRIPTION OF WORK

Contractor shall place, install, adjust and remove all forms and formwork as necessary for cast-in place concrete a as indicated per the construction plans and as denoted in the General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work in this section. Forms shall be either wood of steel designed to meet the conditions specified herein.

1.3 QUALITY ASSURANCE

A. The formwork shall be designed for the loads, lateral pressure, and allowable stresses outlined in "Recommended Practice for Concrete Formwork", ACI 347 and for design considerations, wind loads, allowable stresses and other applicable requirements of the local
building code. The design and construction of the formwork shall be the responsibility of the Contractor. Form design shall be certified by a Registered Structural Engineer.

B. The formwork shall be true in every respect to produce hardened concrete to the required shape, size, grade, and alignment as indicated on the Construction Drawings, and of sufficient strength, bracing, and rigidity to maintain their position and shape under the loads incidental to placing and curing the concrete, as well as other forces resulting from the movement of the forms. The forms shall be mortar-tight at the time concrete is placed in them and shall be so constructed that the surfaces of the finished concrete will be reasonably free from ridges, fins, offsets, or similar defects. Adequate and suitable means for removing the forms without injury to the surfaces or edges of the finished concrete shall be provided.

C. Formwork shall be constructed such that the hardened surfaces shall conform to the tolerance
limits of ACI 347.

FORMS AND ACCESSORIES

A. Plywood forms will be grade marked Exterior Grade, B-B Concrete Form or High Density
Overlay (HDO) Concrete Form B-B, conforming to the requirements of the NIST Voluntary

Product Standard PS-1, Plywood.

B. Metal Forms will use smooth metal plate free of surface irregularities.

C. Hardboard forms will be tempered, smooth one side, not less than 3/16 inch thick conforming to the requirements of ANSI 135.4, Basic Hardboard.

D. Form ties will be factory fabricated, snap-off metal type of adequate design to minimize form deflection and preclude concrete spalling upon removal.

E. Form ties will be fabricated so that set back in the concrete is such that the portion of the tie remaining after snap-off and removal of the exterior portions is at least 1-1/2 inches back
from the concrete surface.

F. Form coating will be non-grain-raising and non-staining resin or polymer type that will not leave residual matter on the surface of the concrete or adversely affect bonding to concrete of paint, plaster, mortar, protective coatings, waterproofing or other applied materials. Coatings containing mineral oils, paraffin, and other non-drying ingredients are not permitted. For concrete surfaces contacting potable stored water, the coatings and form release agents shall be completely non-toxic and approved by the EPA for the intended use.

PRODUCT DELIVERY, STORAGE AND HANDLING

Store and handle form coating to prevent contamination of coating in accordance with manufacturer's recommendation.

1.4 SUBMITTALS

Field verification and inspection notes will verify the correct forms and formwork

PART 2 - PRODUCTS

Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal or other approved panel materials.

2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. High-density overlay, Class 1 or better.

b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.

c. Structural 1, B-B or better; mill oiled and edge sealed.

d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed

PART 3 – EXECUTION

3.1 FABRICATION

A. Use forms that conform to ACI 347. Fabricate with facing materials that produce the specified tolerance requirements of ACI Special Publication No. 4, Formwork for Concrete, produce true surfaces, sharp corners and true lines and are free of offsets, ridges, bulging, waves and concave or convex areas.

B. Use regular and uniform pattern; long dimension of panels vertical; joints horizontal, vertical and aligned; form ties uniformly spaced and aligned in horizontal and vertical rows.

3.2 PREPARATION

A. Forms shall not be reused if there is any evidence of surface wear and tear or defects which would impair the quality of the surface. All surfaces of forms and embedded materials shall be cleaned of any mortar from previous concreting and of all other foreign material or water before coating is placed on them.

B. Forms shall be coated in accordance with manufacturer's recommendations before the form or reinforcement is placed in final position. Surplus coating on form surfaces, or any coating on reinforcing steel and construction joints shall be removed before placing concrete.

3.3 INSTALLATION, REMOVAL AND SHORING

A. Installation of forms will comply with the following requirements:

1. Forms shall be sufficiently tight to prevent loss of mortar from the concrete, set true to the lines and elevations indicated on the Drawings, tied, and braced to remain true during and after concrete placement within tolerances of Part 2.1 of this Specification. The Project Manager may at any time condemn any section or sections of forms found deficient in any respect, and such form shall be promptly removed and replaced.

2. No wooden spreaders shall be allowed to remain in the concrete.

3. Place chamfer strips in forms to bevel all corners, edges, joints and other structural elements exposed to views, including use of dummy chamfer and false joints to provide neat and uniform appearance. Exposed corners and edges shall have 1-inch x 1-inch - 45 degree chamfers, unless otherwise indicated on the Construction Drawings.

4. Provide temporary openings at the base of wall forms and at the other points when necessary to facilitate cleaning and inspection immediately before depositing concrete.

5. Secure in position wedges used for final alignment and items to be embedded in

concrete.

6. Forms for keyways shall be prepared in advance of pouring concrete. Keyway forms in slab edges and vertical wall joints shall be rigidly secured in place before the concrete is poured. Forms for keyways for horizontal joints in walls may be placed at the conclusion of the pour, but proper provision shall be made for obtaining and holding the full depth and form of the keyway.

B. Adjustment of forms will comply with the following requirements:

1. Positive means of adjustment should be provided to permit realignment or readjustment of shores if excessive settlement occurs.

2. A pair of wedges may be used at the top or bottom of shores, but not at both ends, to facilitate vertical adjustment, to correct uneven settlements, or to facilitate dismantling of the formwork.

3. Screw jacks for pipe shores or scaffold-type shoring may be used both top and bottom so long as they are secured by the shore or scaffold leg against loosening or falling out, to avoid lateral deflections.

4. During and after concreting, but before initial set of the concrete, the elevations, camber, and plumbness of formwork systems shall be checked, using telltale devices. Appropriate adjustments shall be promptly made where necessary. If, during construction, any weakness develops and the formwork shows any undue settlement or distortion, the Work shall be stopped, the affected construction removed if permanently damaged, and the formwork strengthened.

3.4 EMBEDDED ITEMS

A. Items to be embedded in concrete shall be free from oil or foreign matter that would weaken the bonding of the concrete to these items.

C. Install in the formwork requisite inserts, anchors, sleeves, and other items specified under other sections of these Specifications. Close ends of conduits, piping, and sleeves embedded in concrete with caps or plugs.

D. Concrete pads, curbs, pedestals, and similar means devised by the Contractor to support the forms will be subject to review by the Project Engineer.

E. Before depositing concrete, check the location and support of items which are to be wholly or partially embedded.

E. Place reinforcement so that there will be a clear distance of at least 2 inches between the reinforcement and any anchor bolts or other embedded metal work.

3.5 FIELD QUALITY CONTROL

A. Construct elements to meet the allowable tolerances of the dimensions, elevations, and positions specified in Specification 033000.

B. Deposit concrete only when the forms and placement of the reinforcement has been checked and approved by the Project Manager. The Contractor shall provide notice to the Project Engineer at least 24 hours in advance of any contemplated concrete pour.

3.6 JOINTS

A. Unless otherwise directed, make contraction, expansion, and construction joints only where shown.

B. Continue reinforcing steel and wire fabric across construction joints which are not indicated as being free to move.

3.7 REMOVAL OF FORMS, FALSE WORK AND CENTERING

Maintain forms, false work, and centering in place until the concrete has attained the minimum percentage of specified design strength for the structural members to carry their own weight and any loads to which they will be subjected without exceeding the permissible stresses and without deforming.

PART 4 - MEASUREMENT AND PAYMENT

Concrete Forms and Formwork shall be included as part of the lump sum for each of the bid items, as appropriate.

END OF SECTION

SECTION 033500

CONCRETE FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work in this section.

1.2 DESCRIPTION OF WORK

Concrete shall be finished in accordance with the latest Virginia Department of Transportation Specifications and Standards and all Federal Regulations and Laws.

Were applicable, CG-12 detectible warnings surfaces shall be installed as depicted on the construction plans and in accordance with Section 321700.

1.3 QUALITY ASSURANCE

A. Comply with the latest VDOT Road and Bridge Specifications:

1. Exposed Aggregate Finish	C504C00-0708
2. CG-12 Detectable Warning Surface	S504B00
3. Patching Hydraulic Cement Concrete Pavement	S509B01
4. Driveway Aprons	Section 316
5. Curb and Gutter	Section 502
6. Sidewalk	Section 504

B. Comply with the latest edition of the VDOT Road and Bridge Standards, Volume I and II.

1.4 SUBMITTALS

Material Certificates – Provide copies of material certificates signed by material producer and contractor, certifying that each material item complies with, or exceed, specified requirements.

1.5 SITE CONDITIONS

A. Concrete finishing to be completed after Cast-In-Place Concrete (Section 033000) has been completed.

B. CG-12 Detectable Warning surface to be installed per the directions of the manufacturer and Section 321700.

C. CG-12 Detectable Warning surface domes to be pointed towards the direction of travel

PART 2 – PRODUCTS

Comply with VDOT approved manufacturer specifications and Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work in this section.

PART 3 – EXECUTION

A. Repair of Surface Defects (repair of improperly placed or finished concrete):

1. Surface defects, unless otherwise specified by the CONTRACT DOCUMENTS, shall be repaired immediately after form removal, but not before review by ENGINEER. The surface temperature of the concrete shall be fifty degrees Fahrenheit (50^{o}F) and rising. CONTRACTOR shall measure surface temperatures when requested by OWNER. If necessary, CONTRACTOR shall enclose and heat the area to be repaired to bring the surface temperature of the concrete and air temperature to acceptable levels, and to permit proper curing.

2. All honeycombed and other defective concrete shall be removed down to sound concrete. If chipping is necessary, the edges shall be perpendicular to the surface or slightly undercut. Feathered edges shall not be permitted. The area to be patched and an area at least six (6) inches wide surrounding it shall be dampened to prevent absorption of water from the patching mortar. A bonding grout shall be prepared, mixed to the consistency of thick cream, and after surface water has evaporated from the area to be patched, well brushed into the surface.

3. When the bond coat begins to lose the water sheen, the premixed patching mortar shall be applied. The mortar shall be thoroughly consolidated into place and struck off so as to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, it shall be left undisturbed for at least one (1) hour before being finally finished. The patched area shall be kept damp for seven (7) days. Metal tools shall not be used in finishing a patch in a formed wall that shall be exposed.

B. Finishing of Unformed Surfaces: Unless otherwise shown on the DRAWINGS unformed surfaces shall be finished as follows:

1. No wetting of concrete surfaces during slab finishing operations shall be permitted. Further, no concrete finishing operation shall be permitted while there is water on the surface of slabs and other flatwork.

2. Finishes that are exposed and subject to foot traffic shall receive a broom finish with a texture of plus or minus one-sixteenth (± 1/16) inch or as designated on the construction plans and/or per VDOT Specifications.

3. Finishes shall promote positive drainage along the cross slope of the concrete.

4. Stairways and Sidewalks: Strike smooth tops of stairs and sidewalks and finish with a light broom providing a texture of plus or minus one-sixteenth (±1/16) inch or as designated on the construction plans and/or per VDOT Specifications.

C. CG-12 Detectable Warning Devices. Install per manufacturer specifications and recommendations and per Section 321700.

PART 4 – MEASUREMENT AND PAYMENT

Concrete finishing shall be included as part of the lump sum.

END OF SECTION

SECTION 311100

CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Remove surface debris from site (e.g. designated plant life, including stumps, grass areas, and miscellaneous debris) as shown on the plans and necessary to construct the proposed improvements.

B. Grading of disturbed areas shall be provided to match final grading as shown on contract drawings.

1.2 REGULATORY REQUIREMENTS

Comply with all applicable requirements of the Town of Herndon Department of Public Works (DPW) and Virginia Department of Transportation (VDOT) Road and Bridge Specifications.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 PROTECTION

A. Protect utilities from damage including electric/power poles as labled in plans.

B. Protect private property including but not limited to: mailboxes, landscaping, shrubbs, roof drains, yard lighting, fences, etc.

C. Protect trees, plant growth, and existing structures. Notify the Department of Public Works immediately if adjacent trees, plants or structures appear to be in danger. Do not resume work until corrective measures have been taken. Any fences required to be temporarily removed must be reinstalled to the satisfaction of the Department of Public Works.

D. Protect survey benchmarks. Mark and reference points from displacement or damage.

3.2 CLEARING

A. Clear areas required for access to site and execution of Work.

B. Remove items shown on the plans and as necessary to construct the proposed

improvements.

C. Temporarily remove any fences required to install proposed improvements.

3.3 CLEAN UP

A. Remove debris and extracted plant life from site.

B. Burning of debris and extracted plant life on site is prohibited.

PART 4 - MEASUREMENT AND PAYMENT

A. Site clearing and grubbing work shall be included as part of the lump sum.

END OF SECTION

SECTION 311300

SELECTIVE TREE AND SHRUB REMOVAL AND TRIMMING

GENERAL

RELATED DOCUMENTS

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

The contractor to contact the Town of Herndon Community Forester prior to making any selective tree, shrub removal and/or trimming.

SUMMARY

This Section includes the protection and trimming of trees that interfere with, or are affected by, execution of the Work, whether temporary or new construction.

Related Sections include the following:

- Section "Clearing and Grubbing" for removal limits of trees, shrubs, and other plantings affected by new construction.
- Section "Earthwork" for structures and utility trench excavation, backfilling, compacting and grading requirements, and soil materials.
- Section "Planting" for tree and shrub planting and transplanting, tree support systems, and soil materials.

SUBMITTALS

Product Data: For each type of product indicated.

Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

Certification: From a qualified arborist that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

Maintenance Recommendations: From a qualified arborist – Town of Herndon Community Forester will make a recommendation for care and protection of trees affected by construction during and after completing the Work.

QUALITY ASSURANCE

Tree Service Qualifications: An experienced tree service firm that has successfully completed tree protection and trimming work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site on a full-time basis during execution of the Work.

Arborist Qualifications: An arborist certified by the International Society of Arboricultural or licensed in the jurisdiction where Project is located.

Tree Pruning Standards: Comply with ANSI A300, "Trees, Shrubs, and Other Woody Plant Maintenance--Standard Practices," unless more stringent requirements are indicated.

Preinstallation Conference: Conduct conference at Project site.

Before starting tree protection and trimming, meet with representatives of authorities having jurisdiction, Owner, Architect, consultants, and other concerned entities. Review tree protection and trimming procedures and responsibilities. Notify participants at least three working days before convening conference. Record discussions and agreements and furnish a copy to each participant.

PRODUCTS

MATERIALS

Drainage Fill: Selected crushed stone, or crushed or uncrushed gravel, washed, ASTM D 448, Size 24, with 90 to 100 percent passing a 2-1/2-inch sieve and not more than 10 percent passing a 3/4-inch sieve.

Topsoil: Fertile, friable, surface soil, containing natural loam and complying with ASTM D 5268. Provide topsoil that is free of stones larger than 1 inch in any dimension, free of other extraneous or toxic matter harmful to plant growth, and free of invasive or noxious weed plants or seed. Obtain topsoil only from well-drained sites where soil occurs in depth of 4 inches or more; do not obtain from bogs or marshes.

Filter Fabric: Manufacturer's standard, nonwoven, pervious, geotextile fabric of polypropylene, nylon, or polyester fibers.

Chain Link Fence: Metallic-coated steel chain link fence fabric, 0.120-inch-diameter wire size; 48 inches high, minimum; line posts, 1.9 inches in diameter; terminal and corner posts, 2-3/8 inches in diameter; top rail, 1-5/8 inches in diameter; bottom tension wire, 0.177 inch in diameter; with tie wires, hog ring ties, and other accessories for a complete fence system.

EXECUTION

PREPARATION

Temporary Fencing: Install temporary fencing located as indicated or outside the drip line of trees to protect remaining vegetation from construction damage.

Install chain link fence according to ASTM F 567 and manufacturer's written instructions.

Protect tree root systems from damage due to noxious materials caused by runoff or spillage while mixing, placing, or storing construction materials. Protect root systems from flooding, eroding, or excessive wetting caused by dewatering operations.

Do not store construction materials, debris, or excavated material within the drip line of remaining trees. Do not permit vehicles or foot traffic within the drip line; prevent soil compaction over root systems.

Do not allow fires under or adjacent to remaining trees or other plants.

EXCAVATION

Install shoring or other protective support systems to minimize sloping or benching of excavations.

Do not excavate within drip line of trees, unless otherwise indicated.

Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks and comb soil to expose roots.

Relocate roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and relocate them without breaking. If encountered immediately adjacent to location of new construction and relocation is not practical, cut roots approximately 3 inches back from new construction.

Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

Where utility trenches are required within drip line of trees, tunnel under or around roots by drilling, auger boring, pipe jacking, or digging by hand.

Root Pruning: Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots with sharp pruning instruments; do not break or chop.

REGRADING

Grade Lowering: Where new finish grade is indicated below existing grade around trees, slope grade beyond drip line of trees. Maintain existing grades within drip line of trees or as recommended by qualified arborist.

Root Pruning: Prune tree roots exposed during grade lowering. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots with sharp pruning instruments; do not break or chop.

Minor Fill: Where existing grade is 6 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.

Moderate Fill: Where existing grade is more than 6 inches, but less than 12 inches, below elevation of finish grade, place drainage fill, filter fabric, and topsoil on existing grade as follows:

Carefully place drainage fill against tree trunk approximately 2 inches above elevation of finish grade and extend not less than 18 inches from tree trunk on all sides. For balance of area within drip-line perimeter, place drainage fill up to 6 inches below elevation of grade.

Place filter fabric with edges overlapping 6 inches minimum.

Place fill layer of topsoil to finish grade. Do not compact drainage fill or topsoil. Hand grade to required finish elevations.

TREE PRUNING

Prune remaining trees affected by temporary and new construction.

Prune remaining trees to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by qualified arborist.

Pruning Standards: Prune trees according to ANSI A300:

Type of Pruning: Crown cleaning.

Cut branches with sharp pruning instruments; do not break or chop.

Chip branches removed from trees. Spread chips where indicated or as directed by the Town of Herndon.

TREE REPAIR AND REPLACEMENT

Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs, and roots according to written instructions of the qualified arborist.

Remove and replace dead and damaged trees that the qualified arborist determines to be incapable of restoring to normal growth due to damage caused by the construction activity. Coordinate with the Town Urban Forester for determination.

Aerate surface soil, compacted during construction, 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch- diameter holes a minimum of 12 inches deep at 24 inches o.c. Backfill holes with an equal mix of augured soil and sand.

DISPOSAL OF WASTE MATERIALS

Burning is not permitted.

Disposal: Logs, stumps, roots, brush, rotten wood, and other refuse from the clearing and grubbing operations, which shall also include excavated material, displaced trees, and excess chips from Owner's property.

PART 4 - MEASUREMENT AND PAYMENT

A. Tree protection and trimming work shall be included in the lump sum cost of each Bid Item as appropriate.

END OF SECTION

SECTION 312000

EARTH MOVING (GRADING)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work specified in this section.

Bedrock formations are common in the town limits and should be considered in the contractors bid analysis. Contractor shall assume responsibility for all excavation. There will be no additional compensation for rock excavation.

1.2 DESCRIPTION OF WORK

The extent of earthwork is as shown on the drawings and as herein specified:

A. Preparation of subgrade for roads, driveways, walks, and landscape areas;

B. Rough grading and finish site grading;

C. Excavation and backfill required in conjunction with waterline installation and utility relocation;

D. Gravel, concrete and/or asphalt driveway restoration, as indicated on plans.

1.3 QUALITY ASSURANCE

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of Town of Herndon and Virginia Department of Transportation Road and Bridge Specifications (VDOT Specifications).

B. Testing and Inspection Service: Contractor shall employ, at no additional cost to the Town, an adequate geotechnical testing company to perform soil testing, compaction tests, and inspection services for quality control during earthwork operations. Geotechnical field inspections and testing shall be conducted during earthwork operations, at frequencies and intervals specified in the contract documents. Selected geotechnical company shall be acceptable to the Department of Public Works. In accordance with General Conditions Section 7.5.1, the CONTRACTOR shall pay for all inspections, tests and certifications which the Contract specifically requires him to perform or pay. The CONTRACTOR is hereby specifically required to obtain and pay for said testing services.

C. Surveying Services:
   1. Construction Survey Stakeout shall be performed by Contractor

2. Contractor will perform general survey stake-out at the site and provide the DPW with necessary grade sheets before the commencement of construction activities.
3. The Contractor shall preserve and maintain in proper position all property corners, hubs, traverse points, and bench marks, existing or provided. If any such monuments are disturbed by the Contractor's employees, equipment or his neglect to give them proper protection, those so disturbed shall be reset by a Certified Land Surveyor, registered in the Commonwealth of Virginia, at the Contractor's expense.

1. 4 SUBMITTALS

A. Test Reports: Submit the following reports directly to Department of Public Works from the testing laboratory.

1. Verification of each foundation subgrade for storm drain, sanitary sewer, and water structures
2. Field density test reports, as further defined by the contract documents
3. One optimum moisture - maximum density curve for each type of soil encountered.
4. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.

1.5 JOB CONDITIONS

A. Site Information: Data referring to subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Owner will not be responsible for interpretations or conclusions drawn therefrom by the Contractor. Data is made available solely for the convenience of Contractor. Geotechnical data and boring logs can be found in this section. Please note that geotechnical information is general in nature and does not purport to represent comprehensive field conditions.

Additional test borings and other exploratory operations may be made by Contractor at no cost to Town of Herndon.

B. Existing Utilities: Contractor shall field verify location of existing utilities, by method of test pitting, prior to commencing any other part of the work. Contractor is responsible for notification to "Miss Utility" or the "One-Call" system. If utilities are to remain in place, provide adequate means of protection during earthwork operations. Any utilities damaged by construction operations shall be repaired to satisfaction of utility owner, at no cost to the Town of Herndon.

1. Should piping or other utilities be encountered during excavation, notify the Department of Public Works and consult the utility owner for directions. Cooperate with Town of Herndon and utility companies in keeping respective services and facilities in operation.

C. Use of Explosives: The use of explosives is not permitted.

D. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as required by Virginia Department of Transportation regulations. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations. Erect sheeting, shoring, and bracing as necessary for protection of persons, improvements, and excavations. Open, uncovered excavations will not be permitted overnight.

1. Perform excavations within drip-line of large trees to remain by hand, and protect the root system from damage or dryout to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with burlap. Paint root cuts of 1-1/2" (37 mm) diameter and larger with emulsified asphalt tree paint.

E. Dust Control: Use necessary means to control dust on and near the work if such dust is caused by Contractor's operations during the performance of work, or if resulting from the condition in which Contractor leaves the site.

1. Thoroughly moisten all surfaces as required to prevent dust being nuisance to the public, the Owner, and the concurrent performance of other work on the site.
2. Contractor shall comply with local regulations regarding control and abatement of dust and dirt produced by construction operations.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Definitions:

1. Satisfactory soil materials are defined as those complying with either the American Association of State Highway and Transportation Officials (AASHTO) M145, Soil Classification Groups A-1, A-2-4, A-2-5, A-2-6, A-2-7, A-3 & A-4 or ASTM D 2487 Soil Classification Groups GC, SC, ML, GW, GM, SM, SW, and SP.
2. Unsatisfactory soil materials are defined as those complying with either AASHTO M145, Classification Groups A-5, A-6, A-7, or ASTM D 2487 Soil Classification Groups MH, CL, CH, OL, OH, and PT.
3. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed sand as per VDOT Specification Section 208; Dense Graded Aggregate - 21A.
4. Drainage Fill: Washed, uniformly graded mixture of crushed stone or crushed or uncrushed gravel, with 100% passing a 1-1/2" (37mm) sieve and not more than 5% passing a No. 4 sieve.
5. Backfill and Fill Materials: Satisfactory soil materials free of the following: clay, rock or gravel larger than 2" (50mm) in any dimension, debris, waste, frozen materials, organic and other deleterious matter.
6. Rock: Solid homogeneous interlocking crystalline material with firmly cemented,

laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers, also large boulders, buried masonry, or concrete other than pavement exceeding (0.375) cubic meter in volume. Removal of hard material will not be considered rock excavation because of intermittent drilling and blasting that is performed to merely to increase production.

7. Hard Materials: Weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" but which usually require the use of heavy excavation equipment, ripper teeth or jack hammers for removal.

PART 3 - EXECUTION

3.1 EXCAVATION

A. All excavation is unclassified. Limited identification of the type or character of the underlying soils within the project area has been made. Geotechnical data provided are included for reference. All excavation within the project limits shall be included in the lump sum contract price regardless of material encountered during excavation. Notice should be made to the existing depth of weathered and parent rock along the project site. Interpretation of the Geotechnical data included is the sole responsibility of the Contractor. Contractor is responsible for cost of rock excavation as part of his Bid price.

B. Unauthorized excavation consists of materials beyond indicated subgrade elevations or dimensions without specific direction of Department of Public Works. Unauthorized excavation, as well as remedial work directed by the Department of Public Works, shall be at the Contractor's expense.

1. Under storm drain structure foundation bases, fill unauthorized excavation by extending the indicated bottom elevation of the footings or base to the excavation bottom, without altering required top elevation. Concrete fill may be used to bring elevations to proper position when acceptable to Department of Public Works.
2. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Department of Public Works.

C. Additional Excavation: When excavation has reached required subgrade elevations, notify the Department of Public Works who will make an inspection of conditions.

1. If unsuitable bearing materials are encountered at the required subgrade elevations, carry excavations deeper and replace the excavated material as directed by Department of Public Works.
2. Removal of unsuitable material and its replacement as directed will be paid on the basis of contract conditions relative to changes in work.

D. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances of Town of Herndon. Shore and brace where sloping is not possible because of space restrictions or stability of materials excavated.

1. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

E. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, cribbing, uprights, stringers and cross-braces, in good serviceable condition.

1. Conduct trench shoring and bracing to comply with the County of Fairfax codes.
2. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.
3. Provide permanent steel sheet piling, pressure creosoted timber cribbing, or steel piling whenever subsequent removal of piling might permit lateral movement of soil under adjacent structures. Cut tops as required and leave permanently in place.
4. Piling, cribbing, and shoring left permanently in place shall be surveyed, and documented on the final asbuilt drawings showing horizontal and vertical locations.

F. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown.

G. Excavation for Trenches: Dig trenches to the uniform width required for the particular item to be installed, sufficiently wide to provide ample working room. Provide 6 inches to 9 inches (150mm to 225mm) clearance on both sides of pipe or conduit.

1. Excavate trenches to the depth indicated or required. Carry the depth of trenches for piping to establish the indicated flow lines and invert elevations.
2. Where rock is encountered, carry excavation 6 inches (150mm) below required depth of trenches for pipe to establish the indicated flow lines and invert elevations.
3. For pipes or conduit 5 inches (125mm) or less in nominal size and for flat-bottomed multiple-duct conduit units, do not excavate beyond indicated depths. Hand excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.
4. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for entire body of pipe.
5. Do not backfill trenches until test and inspections have been made and backfilling authorized by Department of Public Works or its representative. Use care in backfilling to avoid damage or displacement of pipe systems.

H. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35°F (2°c).

3.2 DEWATERING

A. Prevent surface water and subsurface or ground water from flowing into excavations and

from flooding project site and surrounding area.

B. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

C. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey water removed from excavations and rain water to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

3.3 COMPACTION

A. General: Control soil compaction during construction providing minimum percentage of density specified for each area classification indicated below.

1. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with ASTM D 1557, and not less than the following percentages of relative density, determined in accordance with ASTM D 2049, for soils which will not exhibit a well-defined moisture-density relationship (cohesionless soils).

B. Proposed Utility Lines (inc. waterline): Compact top 12 inches (300mm) of subgrade and each layer of backfill or fill material at 90% maximum density for cohesive material or 95% relative density for cohesionless material.

C. For Roadways and Parking Areas: Prepare and compact subgrade and fill in accordance with VDOT Specifications and the Town of Herndon.

D. Walkways: Compact top 6 inches (150mm) of subgrade and each layer of backfill or fill material at 90% maximum density for cohesive material or 95% relative density for cohesionless material.

E. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations. Where subgrade or layer of soil material exhibits moisture content exceeding optimal limits, condition soil to reduce moisture content to the optimal range.

1. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
2. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.4 BACKFILL AND FILL

A. General: Place satisfactory soil material in layers to required subgrade elevations for each classification listed below:

1. In excavations, use satisfactory excavated or borrow fill material except where occurring under building or paved areas.
2. Under grassed areas, use satisfactory excavated or borrow fill material.
3. Under walks and pavements, use subbase material or satisfactory excavated or borrow material or combination of both.
4. Under piping and conduit, use subbase material where indicated. Shape to fit bottom of cylinder.
5. For driveway restorations, use material matching the existing driveway material, as approved by the DPW.
6. Backfill excavations as promptly as work permits but not until completion of the following:

    a. Acceptance of construction below finish grade, including, where applicable, perimeter insulation and water-proofing.
    b. Inspection, testing, approval, and recording locations of underground utilities.
    c. Removal of concrete formwork.
    d. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and leave in place, if required.
    e. Removal of trash and debris.

B. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

1. When existing ground surface has a density less than that specified under "Compaction" for the particular area classification, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required percentage of maximum density.

C. Placement and Compaction: Place backfill and fill material in layers not more than 6 inches (150mm) in loose depth.

1. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

2. Place backfill and fill material evenly adjacent to structures, pipe, and appurtenances to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by placing the material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

3.5 GRADING

A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finish surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades. Grade areas to prevent ponding.

B. Grading Outside Building Lines: Grade areas adjacent to building lines and retaining wall to drain away from structures and to prevent ponding at a minimum of 1/4 inch per foot (6mm per 300mm).

1. Finish surfaces free from irregular surface changes.

C. Lawn or Unpaved Areas: Finish areas to receive minimum 4 inches (100mm) of topsoil per Virginia Erosion and Sediment Control Handbook Std. And Spec. 3.30, latest edition, to within not more than 0.10 ft. (30mm) above or below the required elevations.

D. Walks: Shape surface of areas under pavement to line, grade and cross-section with finished surface not more than 1/2 inch (12mm) above or below required elevation, when tested with a 10 foot (3.05m) straightedge.

3.6 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Testing service shall inspect and approve subgrades and fill layers before further construction work is performed.

1. Perform field density tests in accordance with ASTM D 1556 (sand cone method) or ASTM D2167 (rubber balloon method), as applicable, or with a nuclear density gauge.

B. Subgrade for Proposed Utilities: For each strata of soil on which sanitary sewer, water, and storm drain structures and pipes will be placed, conduct at least one field density test to verify required design bearing capacities. Subsequent verification and approval of each subgrade may be based on a visual comparison of each subgrade with related tested strata, when acceptable to Department of Public Works or its representative.

C. Paved Areas: Make at least one field density test of subgrade for every 500 sq. ft. of paved area but in no case less than 3 tests. In each compacted fill layer, make one field density test for every 500 sq. ft. of overlaying subbase material, fill, or paved area, but in no case less than 3 tests.

D. Backfill: Make at least one field density test of each compacted backfill layer for every 500 sq. ft. within trench excavations, but in no case less than 3 tests. Field density tests on backfill must occur during the backfill operations. Coordinate location and schedule of tests with the DPW.

1. If, in opinion of Department of Public Works or its representatives, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense to the Town of Herndon.

3.8 MAINTENANCE

A. Protection of Graded Area: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

1. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

C. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

PART 4 MEASUREMENT AND PAYMENT

A. Earthwork work shall be included as part of the lump sum.

END OF SECTION

SECTION 312500

EROSION AND SEDIMENT CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work specified in this section.

Virginia Department of Environmental Quality latest regulations on Erosion and Sediment Controls and Storm Water Management.

Northern Virginia BMP Handbook

1.2 DESCRIPTION OF WORK

This section specifies materials and work required to control soil erosion and sedimentation and provide tree protection.

1.3 QUALITY ASSURANCE

Codes and Standards - Comply with Virginia Erosion and Sediment Control Handbook, latest edition.

1.4 SITE CONDITIONS:

The following erosion and sediment controls are recommended:

D. Inlet Protection - Std. & Spec. 3.07

E. Tree Protection - Std. & Spec. 3.38

F. Temporary Soil Stabilization – Std. & Spec. 3.31

1. Temporarily stabilize all areas, not permanently constructed upon within 7 calendar days, after completion of clearing and earthwork operations.

G. Permanent Soil Stabilization – Std. & Spec. 3.32, as further described in Section 02900.

PART 2 - PRODUCTS

2.1 MATERIALS

All materials shall comply with the Virginia Erosion and Sediment Control Handbook, latest edition. Additional erosion and sediment controls may be required to accommodate field conditions during construction. CONTRACTOR shall accommodate modifications to the erosion and sediment controls as necessary, at no additional cost to the contract.

PART 3 - EXECUTION:

3.1 SEQUENCING

A. Install inlet protection on existing structures, silt fence & perimeter controls, and tree protection before beginning any construction activities.

B. Install temporary seeding as required, in accordance with Virginia E & S Std. & Spec. 3.31

C. Install permanent soil stabilization as required, and in accordance with Section 02900.

3.2 MAINTENANCE:

A. Maintain soil erosion and sediment controls and tree protection devices, until authorized by the Town of Herndon to remove the controls, at no increase to the Contract Sum.

B. Maintain adjoining streets in a clean and mud-free condition. Maintain project area in a dust-free condition.

C. Maintain devices as directed in the Virginia Erosion and Sediment Control Handbook, latest edition.

3.3 REMOVAL

A. General

1. Obtain written authorization from the Town of Herndon Erosion Control Inspector before removing soil erosion and sediment controls.
2. Grade areas affected by removal operations to existing or finish grades indicated, and seed and mulch.

PART 4 - MEASUREMENT AND PAYMENT:

A. Soil erosion and sediment control work shall be included as part of the lump sum.

END OF SECTION

SECTION 313700

RIPRAP

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work in this section.

B. Virginia Department of Environmental Quality latest regulations on Erosion and Sediment Controls and Storm Water Management.

C. Northern Virginia BMP Handbook

D. SECTION 312000

1.2 DESCRIPTION OF WORK

This section shall include items indicated on the plans that relate to the installation of rip rap as shown on the construction plans.

1.3 QUALITY ASSURANCE

Comply with the latest edition of the Virginia Department of Transportation (VDOT) Specifications 414 and Road and Bridge Standards Volume I and II. The latest edition of the Virginia Department of Environment Quality (DEQ); Erosion and Sediment Control Handbook Specification 3.19 and the Virginia Storm water Management Handbook Volumes I and II.

1.4 SUBMITTALS

Product data – Submit suppliers and material data on the material used at the time of shipment. Ensure that the stone meets the sizing requirements as indicated in the construction plans.

PART 2 – PRODUCTS

Comply with VDOT and DEQ approved manufacturer specifications.

PART 3 – EXECUTION

3.1 PREPARATION

Clear proposed riprap area of brush, trees and stumps, and grade to a smooth surface.

Compact filled areas in accordance with Section 310000.

3. 2 BEDDING MATERIAL

Spread a 6 inch layer of bedding material prior to placing riprap. Prevent mixing of bedding material with subgrade.

3.3 RIPRAP INSTALLATION

A. End Dumped: End dump riprap to conform with the lines, grades and thicknesses indicated. End dumped riprap shall be a well graded mass of variable size stones with no areas of uniform size material. Rearrange individual stones, if necessary, by hand or with mechanical equipment to obtain the specified results.

B. Hand Placed: Hand place riprap with the largest stones placed at the bottom of slope. Align stones to obtain a close fit and to minimize voids. Fill spaces between stones with spalls of suitable size.

PART 4 MEASUREMENT AND PAYMENT

Rip Rap shall be included as part of the lump sum.

END OF SECTION

SECTION 321100

BASE COURSES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work in this section.

B. SECTION 312000

1.2 DESCRIPTION OF WORK

Placement of base course(s) (material) for exterior improvements and utilities.

1.3 QUALITY ASSURANCE

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of Town of Herndon and Virginia Department of Transportation Road and Bridge Specifications (VDOT Specifications).

B. Testing and Inspection Service: Contractor shall employ, at no additional cost to the Town, an adequate geotechnical testing company to perform compaction tests, and inspection services for quality control during base cours operations. Geotechnical field inspections and testing shall be conducted during earthwork operations, at frequencies and intervals specified in the contract documents. Selected geotechnical company shall be acceptable to the Department of Public Works. In accordance with General Conditions Section 7.5.1, the CONTRACTOR shall pay for all inspections, tests and certifications which the Contract specifically requires him to perform or pay. The CONTRACTOR is hereby specifically required to obtain and pay for said testing services.

1.4 CODES AND STANDARDS:

Comply with the latest edition of the following:

Virginia Department of Transportation (VDOT) Specifications;

Virginia Department of Transportation (VDOT) and Road and Bridge Standards Volume I and II;

Fairfax County Public Facilities Manual

1.5 SUBMITTALS

A. Test Reports: Submit the following reports directly to Department of Public Works from

the testing laboratory.

1. Field density test reports, as further defined by the contract documents
3. One optimum moisture - maximum density curve for each type of base material placed.
4. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

Definitions: See Section 31200 (Earth Moving)

PART 3 – EXECUTION

3.1 BACKFILL AND FILL

A. General: Place satisfactory soil material in layers to required subgrade elevations for each classification listed below:

1. In excavations, use satisfactory excavated or borrow fill material except where occurring under building or paved areas.
2. Under grassed areas, use satisfactory excavated or borrow fill material.
3. Under walks and pavements, use subbase material or satisfactory excavated or borrow material or combination of both.
4. Under piping and conduit, use subbase material where indicated. Shape to fit bottom of cylinder.
5. For driveway restorations, use material matching the existing driveway material, as approved by the DPW.
6. Backfill excavations as promptly as work permits but not until completion of the following:

    a. Acceptance of construction below finish grade, including, where applicable, perimeter insulation and water-proofing.
    b. Inspection, testing, approval, and recording locations of underground utilities.
    c. Removal of concrete formwork.
    d. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and leave in place, if required.
    e. Removal of trash and debris.

B. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill

material will bond with existing surface.

1. When existing ground surface has a density less than that specified under "Compaction" for the particular area classification, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required percentage of maximum density.

C. Placement and Compaction: Place backfill and fill material in layers not more than 6 inches (150mm) in loose depth.

1. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
2. Place backfill and fill material evenly adjacent to structures, pipe, and appurtenances to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by placing the material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

3.2 PAVEMENT SUBBASE COURSE

A. General: Subbase course consists of placing material, in layers of specified thickness, over subgrade surface to support a pavement base course.

B. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.

C Placing: Place subbase course material on prepared subgrade in layer of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.

1. When a compacted subbase course is shown to be 6" (150mm) thick or less, place material in a single layer. When shown to be more than 6" (150mm) thick, place material in equal layers, except no single layer more than 6" (150mm) or less than 3" (75mm) in thickness when compacted.

3.3 COMPACTION

A. General: Control soil compaction during construction providing minimum percentage of density specified for each area classification indicated below.

1. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with ASTM D 1557, and not less than the following percentages of relative density,

determined in accordance with ASTM D 2049, for soils which will not exhibit a well-defined moisture-density relationship (cohesionless soils).

B. Proposed Utility Lines (inc. waterline): Compact top 12 inches (300mm) of subgrade and each layer of backfill or fill material at 90% maximum density for cohesive material or 95% relative density for cohesionless material.

C. For Roadways and Parking Areas: Prepare and compact subgrade and fill in accordance with VDOT Specifications and the Town of Herndon.

D. Walkways: Compact top 6 inches (150mm) of subgrade and each layer of backfill or fill material at 90% maximum density for cohesive material or 95% relative density for cohesionless material.

E. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations. Where subgrade or layer of soil material exhibits moisture content exceeding optimal limits, condition soil to reduce moisture content to the optimal range.

1. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
2. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.4 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Testing service shall inspect and approve subgrades and fill layers before further construction work is performed.

1. Perform field density tests in accordance with ASTM D 1556 (sand cone method) or ASTM D2167 (rubber balloon method), as applicable, or with a nuclear density gauge.

B. Subgrade for Proposed Utilities: For each strata of soil on which sanitary sewer, water, and storm drain structures and pipes will be placed, conduct at least one field density test to verify required design bearing capacities. Subsequent verification and approval of each subgrade may be based on a visual comparison of each subgrade with related tested strata, when acceptable to Department of Public Works or its representative.

C. Paved Areas: Make at least one field density test of subgrade for every 500 sq. ft. of paved area but in no case less than 3 tests. In each compacted fill layer, make one field density test for every 500 sq. ft. of overlaying subbase material, fill, or paved area, but in no case less than 3 tests.

D. Backfill: Make at least one field density test of each compacted backfill layer for every

500 sq. ft. within trench excavations, but in no case less than 3 tests. Field density tests on backfill must occur during the backfill operations. Coordinate location and schedule of tests with the DPW.

1. If, in opinion of Department of Public Works or its representatives, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense to the Town of Herndon.

3.5 MAINTENANCE

A. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

B. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

END OF SECTION

SECTION 321200

FLEXABLE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work specified in this section.

1.2 DESCRIPTION OF WORK:

A. Installation of asphalt pavement, asphalt driveway aprons, and utility trench patches.

B. Prepared aggregate subbase is specified in sections 312000 and 321100

1.3 REFERENCES:

A. Virginia Department of Transportation Standard Specifications, all applicable sections.

B. AASHTO Provisional Specification MP-1.

1.4 SUBMITTALS:

A. Material Certificates - Provide copies of material certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

B. Job-Mix Formula - Provide copies of job-mix formula and design test data in accordance with VDOT requirements.

1.5 QUALITY ASSURANCE:

A. Codes and Standards - Comply with Virginia Department of Transportation Standard Specifications, latest edition, and Road and Bridge Standards, latest edition.

B. Testing and Inspection Service: Contractor shall employ, at no additional cost to the Town, an adequate geotechnical testing company to perform monitoring, compaction tests, and inspection services for quality control during paving operations. Geotechnical field inspections and testing shall be conducted during paving operations, at frequencies and intervals specified in the contract documents. Selected geotechnical company shall be acceptable to the Department of Public Works. In accordance with General Terms Section 4.4.1, the CONTRACTOR shall pay for all inspections, tests and certifications which the Contract specifically requires him to perform or pay. The CONTRACTOR is hereby

specifically required to obtain and pay for said testing services.

1.6 SITE CONDITIONS:

A. Weather Limitations - Apply prime and tack coats when ambient temperature is in accordance with Virginia Department of Transportation Standard Specifications, latest edition.

B. Construct asphalt concrete surface course when atmospheric temperature is in accordance with Virginia Department of Transportation Standard Specifications, latest edition.

C. Grade Control - Establish and maintain required lines and elevations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General - Use locally available materials and gradations which exhibit a satisfactory record of previous installations.

B. Base Course Aggregate - Sound, angular crushed stone, crushed gravel, or crushed slag, sand, stone or slag screenings, complying with Virginia Department of Transportation Standard Specifications, latest edition and Road and Bridge Standards, latest edition.

C. Surface Course Aggregate - Crushed stone, crushed gravel, crushed slag, and sharp-edged natural sand, complying with Virginia Department of Transportation standard Specifications, latest edition and Road and Bridge Standards, latest edition.

D. Mineral Filler - Rock or slag dust, hydraulic cement, or other inert material complying with AASHTO M17 (ASTM D242).

E. Asphalt Cement – Performance Graded (PG) conforming to the requirements of AASHTO Provisional Specification MP-1.

F. Prime Coat - cut back asphalt type; AASHTO M82 (ASTM D2027) MC-30, MC-70 or MC-250.

G. Tack Coat - Emulsified asphalt, AASHTO M140 (ASTM D977) or M208 (D2397); SS-1, SSLH, CSS-1 or CSS-Ih, diluted with one part water to one part emulsified asphalt.

H. Herbicide Treatment - Commercial chemical for weed control, registered by the Environmental Protection Agency. Provide granular, liquid or wettable powder form.

I. Manufacturers - Subject to compliance with requirements, provide products of

one of the following:

Allied Chemical Corp.
Achem Products, Inc.
Ciba-Geigy Corp.
Dow Chemical USA
E.I. DuPont De Nemours & Co., Inc.
FMC Corp.
Thompson-Hayward Chemical Co.
U.S. Borax and Chemical Corp.

J. Aggregate Subbase - Shall comply with Subbase Material (Dense Graded Aggregate -21A), Section 02200 of these Specifications.

2.2 ASPHALT-AGGREGATE MIXTURE:

Provide plant-mixed, hot-laid asphalt-aggregate mixture complying with the referenced Special Provisions and as recommended by local paving authorities to suit project conditions.

PART 3 - EXECUTION

3.1 SUBBASE INSTALLATION:

Install aggregate subbase in accordance with the Contract Drawings Proposed Pavement Design or Pavement Restoration Detail, as appropriate, and Section 02200 of these Specifications.

3.2 SURFACE PREPARATION:

A. Remove loose material from compacted subbase surface immediately before applying herbicide treatment or prime coat.

B. Herbicide Treatment - Apply chemical weed control agent in strict compliance with manufacturer's recommended dosages and application instructions. Apply to compacted, dry subbase prior to application or prime coat.

C. Prime Coat - Apply at rate of 0.20 to 0.50 gal. per sq. yd. (0.63 to 1.58 L per sq. m) over compacted subgrade. Apply material to penetrate and seal, but not flood, surface. Cure and dry as long as necessary to attain penetration and evaporation of volatile.

D. Tack Coat - Apply to contact surfaces of previously constructed asphalt or portland cement concrete and surfaces abutting or projecting into asphalt concrete pavement. Distribute at rate of 0.05 to 0.15 gal. per sq. yd. (0.16 to 0.47 L per sq. m) of surface.

1. Allow to dry until at proper condition to receive paving.
2. Exercise care in applying bituminous materials to avoid smearing of adjoining concrete or other permanent surfaces. Remove and clean damaged surfaces.

3.3 PLACING MIX:

A. General - Place asphalt concrete mixture on prepared surface, spread and strike-off. Spread mixture at minimum temperature meeting Virginia Department of Transportation Standard Specification, latest edition and Road and Bridge Standards, latest edition. Place inaccessible and small areas by hand. Place each course to required grade, cross-section, and compacted thickness. Thickness of each course to adhere to VDOT guidelines.

B. Paver Placing - Place in strips of acceptable width to Department of Public Works. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for a section before placing surface course.

C. Joints - Make joints between successive day's work to ensure continuous bonds between adjoining work. Construct joints to have same texture, density and smoothness as other sections of asphalt concrete course. Clean contact surface and apply tack coat.

3.4 ROLLING:

A. General - Begin rolling when mixture will bear roller weight without excessive displacement.

1. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

B. Breakdown Rolling - Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.

C. Second Rolling - Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.

D. Finish Rolling - Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.

E. Patching - Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.

F. Protection - After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough to allow traffic without marking.

3.5 FIELD QUALITY CONTROL:

A. General - Test in-place asphalt concrete courses for compliance with requirements for density, thickness and surface smoothness. Repair or remove and replace unacceptable paving, as directed by Department of Public Works at Contractor's expense.

B. Density – In-place density of asphalt concrete courses shall be tested by the Contractor in accordance with VDOT requirements. Contractor shall provide results of density testing to Department of Public Works.

C. Thickness - In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness:

1. Base Course: 1/2 inch, (12mm) plus or minus
2. Surface Course: 1/4 inch, (6mm) plus or minus

D. Surface Smoothness - Test finished surface of each asphalt concrete course for smoothness, using 10-foot (3.048m) straightedge applied parallel with, and at the right angles to, centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness.

1. Wearing Course Surface: 3/16 inch (5mm)
2. Crowned Surfaces: Test with crowned template centered on, and at right angle to, crown. Maximum allowable variance from template, 1/4 inch (6mm).
3. Check surface areas at intervals as directed by Department of Public Works or its representative.

PART 4 - MEASUREMENT AND PAYMENT

A. Asphalt Concrete Paving shall be included as part of the lump sum

END OF SECTION

SECTION 321600

CURBS, GUTTERS, SIDEWALKS AND DRIVEWAYS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work specified in this section.

1.2 DESCRIPTION OF WORK:

Replacement and installation of curbs, gutters, concrete sidewalks, handicap ramps and concrete driveway entrance aprons.

1.3 QUALITY ASSURANCE:

A. Comply with the latest VDOT Road and Bridge Specifications:

1.	Exposed Aggregate Finish	C504C00-0708
2.	Patching Hydraulic Cement Concrete Pavement	S509B01
3.	Driveway Aprons	Section 316
4.	Curb and Gutter	Section 502
5.	Sidewalk	Section 504

B. The latest edition of Virginia Department of Transportation (VDOT) Standards and Specifications, all applicable sections.

1.4 SUBMITTALS

Material Certificates – Provide copies of material certificates signed by material producer and contractor, certifying that each material item complies with, or exceed, specified requirements.

1.5 SITE CONDITIONS

A. Concrete finishing to be completed after Cast-In-Place Concrete (Section 033000) has been completed.

B. Refer to Sections 031000 and 0335500 for additional specifications.

PART 2 – PRODUCTS

Comply with VDOT approved manufacturer specifications.

PART 3 – EXECUTION

A. Placement and finishing shall be in conformance with the latest VDOT Standards and Specifications.

B. Repair of Surface Defects (repair of improperly placed or finished concrete) per Section 033500.

B. Finishing of Unformed Surfaces: Unless otherwise shown on the DRAWINGS unformed surfaces shall be finished per Section(s) 033000 and 033500.

C. CG-12 Detectable Warning Devices. Install per manufacturer specifications and recommendations.

PART 4 – MEASUREMENT AND PAYMENT

Concrete curbs, getters, sidewalks, handicap ramps and driveway entrances aprons shall be included as part of the lump sum.

END OF SECTION

SECTION 321700

PAVING SPECIALITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work specified in this section.

1.2 DESCRIPTION OF WORK:

This section shall include special construction to enhance the safety and functionality of paved surfaces. Areas of special construction shall be found on the construction plans.

1.3 QUALITY ASSURANCE:

A. The latest edition of Virginia Department of Transportation (VDOT) Standards and Specifications, all applicable sections.

B. Installation per the latest edition of the VDOT Work Area Protection Manual (WPAM) and Manual on Traffic Controls (MUTCD) and the Virginia Supplement.

C. The latest edition of Institute of Transportation Engineers Standards and Specifications, all applicable sections.

D. Products shall meet the latest edition of the AASHTO's National Transportation Product Evaluation Program (NTPEP)

1.4 SUBMITTALS

Material Certificates – Provide copies of material certificates signed by material producer and contractor, certifying that each material item complies with, or exceed, specified requirements.

1.5 SITE CONDITIONS

Proceed with pavement only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 – PRODUCTS

2.1 TACTILE WARNING SURFACES

A. Basis of Design: Drawings and Specifications are based on the following:

1. ADA Solutions, Inc.
   a. Replaceable Wet-Set detectable warning tile panels.
   b. Surface Mount detectable warning tile panels.

2. Subject to compliance with requirements, provide product indicated or a comparable product subject to request for substitution.

B. Description: Homogeneous fiberglass and carbon reinforced composite panels with ADA compliant truncated dome pattern on exposed surfaces, panels are colorfast and UV stable with uniform color throughout the thickness of the panel.

1. Replaceable Wet-Set Detectable Warning Tile Panels: Tile panels designed for setting in freshly poured concrete and mechanically anchored with stainless steel fasteners.
2. Surface Mount Detectable Warning Tile Panels: Tile panels designed for surface application on existing concrete with mechanical and adhesive fastening.
3. Standard Sizes: 24 by 36, 48, and 60 inches; 36 by 36 and 60 inches.
4. Thickness:
   a. Wet-Set Tiles: 1/4 inch nominal thickness with a 3/4 inch thick by 1 inch wide perimeter flange.
   b. Surface Mount Tiles: 3/16 inch thick with 1/2 inch wide beveled edge at all edges.
5. Physical Characteristics:
   a. Compressive Strength: 28,900 psi, ASTM D695.
   b. Slip Resistance: 1.18 dry, 1.05 wet, ASTM C 1028.
   c. Flame Spread Index: Less than 25, ASTM E 84.
   d. Freeze/Thaw/Heat: No disintegration, ASTM C 1026.
6. Tactile Surface Domes:
   a. Dome Diameter: Nominal diameter of 0.90 inches at the base tapering to 0.45 inches at the top.
   b. Dome Height: 0.20 inches nominal.
   c. Dome Arrangement: Square grid pattern with grids aligned perpendicular and parallel to the direction of travel.
   d. Dome Spacing: 2.35 inches nominal center to center spacing.

2.2 PAVEMENT MARKING TAPE

A. Marking tape shall be a retro-reflective pliant polymer material consisting of a mixture of polymeric materials, pigments and glass beads (reflective optics) distributed throughout its cross-sectional area with a reflective layer of beads (reflective optics) embedded into the surface. The surface of the tape shall exhibit raised areas resulting in a profiled (non-flat) surface.

B. The shelf life of the tape for use on facilities constructed or maintained by the Department shall be one year from the date of manufacture when stored in accordance with the manufacturer’s requirements.

C. The marking tape shall not be formulated with any compounds of the heavy metals listed in 40 CFR 261.24 Table 1, except that barium sulfate is allowed. Total heavy metals, with the exception of barium sulfate, shall not exceed 20 times the specified regulatory limits. Materials that must be heated for application shall not exude fumes that are toxic or injurious to persons or property when heated to the application temperature.

D. The marking tape shall be capable of conforming to pavement contours, breaks and faults through the action of traffic at normal range of pavement temperatures. The marking tape shall be capable of application to new and existing asphalt or hydraulic cement concrete at pavement surface temperatures of 45 to 180 degrees Fahrenheit. Where installed with adhesive, the adhesive shall be per the manufacturer's instructions. The marking tape shall also be capable of being inlaid during installation of the final riding surface during paving operation on new, dense, or open-graded asphalt concrete and shall be ready for traffic immediately after application.

E. Marking tape shall be weather resistant and after installation shall show no significant tearing, roll back, lifting, shrinkage, or other signs of poor adhesion, nor appreciable bleeding or discoloring (fading), which will impair the intended use of the marking tape throughout its intended service life.

F. The marking tape shall not deteriorate because of contact with sodium chloride, magnesium chloride, calcium chloride, mild alkalies and acids, or other ice control materials, oils in the pavement material, or oil and gasoline drippings from vehicles.

G. When the pay item specifies Type B, Class VI Contrast pavement marking tape, the tape shall be an additional 3 inches minimum wider than the width specified in the pay item. This additional tape width shall be black non-reflective with 1 ½ inches minimum on both sides of the white.

2.3 PAVEMENT MARKING PAINT

A. Pavement line markings shall be a retro-reflective polymer material consisting of a mixture of polymeric materials, pigments and glass beads and/or reflective optics.

B. The polyurea material shall not be formulated with any compounds of the heavy metals listed in 40 CFR 261.24 Table 1 except that barium sulfate is allowed. Total heavy metals, with the exception of barium sulfate, shall not exceed 20 times the specified regulatory limits.

C. The polyurea coating shall be formed by the reaction of at least two components (Part A and Part B). The components shall be formulated such that the proper cure occurs when they are mixed at the times of the application.

D. The polyurea material shall be capable of application on new and existing asphalt and hydraulic cement concrete surfaces at pavement surface temperatures of 40 degrees Fahrenheit and above. The polyurea material shall maintain its original dimensions and

placement without chipping, spalling, shrinking, cracking, bleeding or discoloring (fading) or other signs of poor performance which will impair the intended use of the marking throughout its intended service life.

E. Materials that must be heated for application shall not exude fumes that are toxic or injurious to persons or property when heated to the application temperature.

F. Glass beads for pavement markings shall conform to the Virginia Department of Transportation Road and Bridge Specifications (1994 Edition), Section 234 - Glass Beads. Section 234 shall be modified by the following amendments:

SECTION 234.02 - DETAIL REQUIREMENTS (234a) SECTION 234.02 - DETAIL REQUIREMENTS 2-26-96 of the Specifications is amended to replace the second sentence with the following:

"Glass beads shall be spherical in shape and shall conform to AASHTO M247 Type 1, except that at least 80% of the beads shall be round when tested in accordance with the requirements of ASTM D 1155 Procedure B."

H. Pavement markings shall be thermoplastic material conforming to the Virginia Department of Transportation Road and Bridge Specifications (1994 Edition), Section 246 - Pavement Markings. Section 246 shall be modified by the following amendments:

Section 246.02(a) White and Yellow Pavement Marking Material is replaced by the following:

"(a) White and Yellow Pavement Marking Material: White pavement marking material shall be equal to Federal Standard Color No. 595-17886, and yellow pavement marking material shall be equal to Federal Standard Color No. 595-33538.

Color determination will be made without drop on beads at least twenty-four (24) hours after application. If not a visual match, the diffuse day color of the marking shall conform to the following CIE Chromaticity coordinates limits:

CIE Chromaticity Coordinate Limits

Color	1		2		3		4		Reflectance Limit Y (%)	
	x	y	x	y	x	y	x	y	min	max
White	0.303	0.287	0.368	0.353	0.340	0.380	0.274	0.316	80.0	---
Yellow	0.492	0.471	0.517	0.462	0.485	0.426	0.468	0.450	50.0	60.0
Yellow thermoplastic shall be									45.0	60.0

Color readings will be determined using a 0 degree/45 degree Hunter Labscan Spectro-Colorimeter using 2 degrees Illuminant C.

The marking material, except Type B, Class IV, V, VI and Type D shall not contain any of the heavy metal materials listed in Commonwealth of Virginia Department of Environmental Quality Hazardous Waste Management Regulations. The material shall not discolor in sunlight.

The amount and type of yellow pigment and inert filler for yellow material shall be at the option of the manufacturer provided all other requirements of this specification are complied with.

If Titanium Dioxide is used, it shall be rutile, ASTM D476, Type IV."

Section 246.02(b)1., the first paragraph after the chart is deleted.

Section 246.02(b)2.a is deleted.

Section 246.02(b)2.f is deleted.

Section 246.02(b)2.j. Flashpoint is replaced by the following:

"j. Flashpoint: The material flashpoint shall be no less than 500°F when tested in accordance with the requirements of ASTM D92."

2.3 SPEED BUMPS

A. Speed bumps shall be constructed of materials that are in conformance with Flexible Paving (Section 321200).

B. Height, width and placement of speed bumps shall conform to the construction plans.

PART 3 – EXECUTION

3.1 PRIOR TO INSTALLATION

A. No earlier than 7 days after completion of surface treatment the Contractor shall sweep the roadway surface prior to installation of pavement markings. Pavement markings shall be installed within 14 days after completion of surface treatment. The cost of sweeping the roadway prior to installing pavement marking shall be included in the price bid for pavement marking

B. The surface shall be free of standing and or puddling water. The Contractor will perform a VTM-94 moisture test result can be conducted to verify the moisture content of the pavement.

C. The eradication of existing pavement markings shall conform to the Virginia Department of Transportation Road and Bridge Specifications (1994 Edition), Subsection 512.03(j) - Eradicating Pavement Markings.

D. Pavement markings shall be installed according to the Virginia Department of Transportation Road and Bridge Specifications (1994 Edition), Section 704 - Pavement Markings and Markers.

3.2 TACTICLE WARNING DEVICES

A. Warning devices shall be installed per the manufacturer’s specifications.

B. It may be required that installation happen during the CONCRETE FINISHING, Section 033500.

C. If necessary, connect multiple plates together. Use supplied lifting rings to place plates into position that are flush with the surrounding concrete.

D. Press assembly into wet concrete and onto lifting rings.

E. Place additional concrete around devices as necessary and remove any concrete that has spilled onto the plat surface.

3.3 INSTALLATION OF PAVEMENT MARKING TAPE

A. Marking configurations shall be installed in accordance with the latest edition of the "Manual on Uniform Traffic Control Devices" (MUTCD), the Virginia Supplement to the MUTCD and the Virginia Work Area Protection Manual (latest edition).

B. Markings shall be installed either under the guidance of the manufacturer’s representative or by the manufacturer’s certified installer.

C. Markings to be installed on existing asphalt concrete roadway surfaces or existing and new hydraulic cement concrete surfaces shall be applied in strict accordance with the manufacturer's recommendations for pavement surface preparation and installation techniques for non-embedded surface applications.

D. Upon delivery of the material to the Contractor, the Contractor shall store all tape in accordance with the manufacturer's requirements until the day of installation, unless otherwise approved. Tape shall not be installed if the material has exceeded its shelf life, has been improperly stored, has deteriorated or is otherwise damaged.

E. Type B, Class VI markings to be inlaid in new asphalt surfaces shall be installed in accordance with the manufacturer's recommendations for surface preparation and installation techniques. Temperature requirements of the asphalt concrete and the type and size of roller allowed shall be in accordance with the tape manufacturer's recommendations. The Contractor shall maintain the road design cross section unless otherwise modified by the contract requirements and ensure that markings are not degraded by the paving operations.

F. Markings shall not be installed directly over longitudinal pavement joints or existing markings.

3.4 INSTALLATION OF PAVEMENT MARKING (PAINT)

A. Marking configurations shall be installed in accordance with the latest edition of the "Manual on Uniform Traffic Control Devices" (MUTCD), the Virginia Supplement to the MUTCD and the Virginia Work Area Protection Manual (latest edition).

B. Markings shall be installed either under the guidance of the manufacturer's representative or by the manufacturer's certified installer.

C. Upon delivery of the material to the Contractor, the Contractor shall store all paint in accordance with the manufacturer's requirements until the day of installation, unless otherwise approved. Paint shall not be installed if the material has exceeded its shelf life, has been improperly stored, has deteriorated or is otherwise damaged

D. Painting shall be durable, when installed, provide guidance in accordance with VDOT Section 704 of the Specifications. The markings should include skip-line and solid-line centerline markings, skip-line and solid-line lane division markings and, solid-line edge – line markings installed on roadways.

E. Pavement markings shall be installed per the latest edition of Virginia Department of Transportation Road and Bridge Specifications, Section 704 - Pavement Markings and Markers. Section 704.03(a) 2 - Type B markings is amended to replace the first paragraph with the following: Type B markings shall be applied in accordance with the manufacturers' installation instructions.

F. Equipment shall be capable of providing mixing, heating and agitation of material. Material

shall be uniformly heated throughout the system in accordance with the manufacturer's recommendations. Thermoplastic material shall be maintained in the heating kettle and applied to the road surface at a minimum temperature of 400°/F. Heating kettles shall be equipped with an automatic thermostatic control device. The Contractor shall furnish a properly calibrated infrared instrument for the purpose of measuring the actual temperature of molten thermoplastic material.

G. Non-truck mounted equipment for application of thermoplastic material shall be of the screed extrude type with a screw drive or shall be self-propelled and regulated to allow for calibration of the amount of material applied. Non-truck mounted equipment for application of polyester and epoxy resin material shall be self-propelled and regulated to allow for calibration of the amount of material applied.

   a. Thermoplastic (Class I) material shall only be applied on asphalt concrete pavements and shall be applied by screed extrude, ribbon gun or spray equipment.

   b. Thermoplastic shall not be applied over existing pavement markings of other materials unless the existing marking is 90% removed.

   c. Primer/adhesive shall be applied to asphalt concrete surfaces more than two years old and shall be from the same manufacturer as the thermoplastic.

E. Glass beads shall be applied to the surface of the marking at the rate of 7 pounds per 100 square feet.”

3.5 SPEED BUMPS

A. Construction of speed bumps at a driveway location should be avoided where possible to reduce potential vehicle conflict.

B. Speeds bumps installed in series should be spaced according to an engineering evaluation of the physical street section as well as traffic operations data.

C. Speed bumps should be located in such a way as to avoid conflict with underground utility access to boxes, vaults and sewers.

PART 4 – MEASUREMENT AND PAYMENT

Paving Specialties shall be included as part of the lump sum.

END OF SECTION

SECTION 329000

PLANTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work specified in this section.

1.2 DESCRIPTION OF WORK:

A. This section shall include plantings special construction to enhance the ascetics and functionality of unpaved surfaces. Areas of planting shall be found on the construction plans.

B. Subgrade Elevations: Excavation, filling and grading required to establish elevations shown on drawings are not specified in this section. Refer to Section 312000.

C. Provide replacement trees and shrubs damaged by construction operations which are not designated to be removed.

1.3 QUALITY ASSURANCE

A. All work shall be done in accordance with Virginia Erosion and Sediment Control Handbook, Latest Edition.

B. SEEDING QUALITY CRITERIA
All seed used for permanent seeding shall be Certified Seed whenever possible. Where certified seed is not available, the minimum requirements for grass and legume seed used in vegetative establishment are as follows:

1. All seed shall be labeled to show that it meets the requirements of the State Seed Law.

2. All seed shall be subject to re-testing by a recognized seed laboratory.

3. All seed used shall have been tested within the six (6) months immediately preceding the date of sowing.

4. Inoculant - the inoculant for treating legume seed in the seed mixtures shall be a pure culture of nitrogran-fixing bacteria prepared for the species. Inoculants shall not be used later than the date indicated on the container. Twice the supplier's recommended rate of inoculant will be used on dry seedings; four times the recommended rate if hydroseeded.

5. The quality of the seed used shall be shown on the bag tags to conform to the guidelines in the following table:

QUALITY OF SEED *

LEGUMES	Minimum Seed Purity %	Minimum Germination %
Crownvetch	98	65**
Lespedeza, Korean	97	85**
Lespedeza, Sericea	98	85**
GRASS		
Bluegrass, Kentucky	97	85
Fescue, Tall (improved, turf-type cultivars)	98	85
Fescue, Red	98	80
Fescue, Tall (KY-31)	97	85
Redtop	94	80
Reed Canarygrass	98	80
Ryegrass	98	90
Weeding Lovegrass	98	87
OTHER ANNUALS		
Annual Ryegrass	97	90
German Millet	98	85
Oats	98	80
Cereal Rye	98	85

* Seed containing prohibited or restricted noxious weeds will not be accepted.
** Includes "hard seed"

Seed should not contain in excess of 0.5% weed seed. To calculate percent pure live seed, multiply germination times purity and divide by 100.

C. SODDING QUALITY CRITERIA.

Sod used shall be state-certified and inspected by the Virginia Crop Improvement Association. Where certified sod is not available, the minimum requirements for sod seed used in vegetative establishment are as follows:

1. Sod shall contain the best grass varieties adapted to the locality and be free of serious disease, insect, or weed problems. It will be dense, have good color, and hold together well.

2. Sod shall be machine cut at a uniform thickness of 3/4 inch (± 1/4 inch) at time of cutting. This thickness shall exclude shoot growth and thatch.

3. Pieces of sod shall be cut to the supplier's standard width and length, with a maximum allowable deviation in any dimension of 5%. Torn or uneven pads will not be accepted.

4. Standard size sections shall be strong enough to support their own weight and retain shape when suspended from a firm grasp on one end of the section.

1.4 SUBMITTALS

Certification - Contractor shall test soil to determine characteristics applicable to seeding and/or sodding work. Submit manufacturer's or vendor's certified analysis for soil amendments and fertilizer materials. Submit other data substantiating that materials comply with specified requirements. Submit seed/sod vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight, and percentages or purity, germination, and weed seed for each grass seed species.

1.5 DELIVERY, STORAGE AND HANDLING

Packaged Materials - Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

Sod pallets - Sod shall not be cut or laid in excessively wet or dry weather. Sod shall be harvested, delivered, and installed within a period of 36 hours.

1.6 JOB CONDITIONS

A. Proceed with and complete landscape work as rapidly as portions of site become available, working within seasonal limitations for each kind of landscape work required.

B. Planting Time - Plant or install materials during normal planting seasons for work required. Correlate planting with specified maintenance periods to provide maintenance for date of substantial completion.

C. Weather limitations: Proceed with planting only when existing and forecasted weather conditions permit.

1.7 MAINTENANCE

A. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but not less than the following periods:

1. Seeded/sodded lawns: 60 days from date of Substantial Completion

a. When full maintenance period has not elapsed before end of planting

season, or if lawn is not fully established, continue maintenance during next planting season.

B. Maintain and establish lawn by watering, mowing, fertilizing, trimming, replanting and other operations, in accordance with Virginia Erosion and Sediment Control Handbook. Reseed/resod bare or eroded areas.

C. Mow lawn as soon as top growth is tall enough to cut. Maintain grass heights and mowing requirements in accordance with Virginia Erosion and Sediment Control standards and Specifications for sodding, whether lawn is established by seeding or sodding.

1.8 SPECIAL PROJECT WARRANTY

Warranty seeding/sodding work through a one year period.

PART 2 - PRODUCTS

2.1 TOPSOILS

Topsoil will be stockpiled for re-use in restoring disturbed areas. Additional topsoil required to ensure turf establishment shall be provided by the Contractor.

2.2 SOIL AMENDMENTS

A. Lime - Natural dolomitic limestone containing not less than 85% of total carbonates with a minimum of 30% magnesium carbonates, ground so that not less than 90% passes a 10-mesh sieve and not less than 50% passes a 100-mesh sieve.

B. Aluminum Sulfate - Commercial grade.

C. Peat Humus - FS Q-P-166 decomposed peat with no identifiable fibers and with ph range suitable for intended use.

D. Bonemeal - Commercial, finely ground, 4% nitrogen and 20% phosphoric acid.

E. Superphosphate - Soluble mixture of treated materials, 20% available phosphoric acid.

F. Sand - Clean, washed sand, free of toxic materials.

G. Perlite conforming to National Bureau of Standard PS 23.

H. Vermiculite - Horticultural grade, free of toxic substances.

I. Manure - well rotted, unleached stable or cattle manure containing not more than 25% by volume of straw, sawdust or other bedding materials and containing no chemicals or ingredients harmful to plants.

J. Commercial Fertilizer - Complete fertilizer or neutral character with some elements derived from sources and containing the following percentages of available plant nutrients.

For lawn, provide fertilizer with percentage of nitrogen required to provide not less and 1 lb. (0.45kg) of actual nitrogen per 100 sq. ft. (9.29 sq. m) of lawn area and not less than 4% phosphoric acid and 2% potassium. Provide nitrogen in a form that will be available to lawn during initial period of growth; at least 50% of nitrogen to be organic in form. Provide soil amendments determined by analysis and seed vendor/manufacturer to be necessary to sustain acceptable turf growth.

2.3 GRASS MATERIAL

Grass Seed - Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America. Provide seed mixture composed of grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified in the Virginia Erosion and Sediment Control Handbook, Latest Edition, Chapter 3.32 "Permanent Seeding".

Sod - Provide freshly cut, certified sod composed of grass species, proportions, and minimum percentages of purity, germination, and maximum percentage of weed seed as specified in the Virginia Erosion and Sediment Control Handbook, Latest Edition, Chapter 3.33, Sodding.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before seeding/sodding, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth.

B. Before seeding/sodding, add soil amendments, fertilizer and topsoil as necessary to promote healthy turf establishment.

3.2 SEEDING

A. Certified seed will be used for all permanent seeding whenever possible. Certified seed is inspected by the Virginia Crop Improvement Association or the certifying agency in other states. The seed must meet published state standards and bear an official "Certified Seed" label.

B. Legume Seed - Legume seed should be inoculated with the inoculant appropriate to the species. Seed of lespedezas, crown vetch, and clover should be scarified to promote uniform germination.

C. Apply Seed - uniformly with a cyclone seeder, drill, cultipacker seeder, or hydroseeder on a firm, friable seedbed. Maximum seeding depth should be 1/4 inch (6mm).

D. Hydroseeding - to avoid seed damage, if a machinery breakdown of 30 minutes to 2 hours occurs, 50% more seed shall be added to the tank, based on the preparation of the slurry remaining in the tank. Should a breakdown of more than 2 hours occur, a full rate of new seed will be required.

Lime shall be applied in pelletized or liquid form. Rates of wood fiber shall be at least 2,000 lbs. per acre (224 kg per ha). Surface roughening is required when hydroseeding.

Legume inoculants shall be applied at four times the recommended rate inoculant is included in the hydroseeder slurry.

3.3 HYDROSEEDING DISTURBED AREAS

A. Mix specified seed, fertilizer and pulverized mulch in water, using equipment specifically designed for hydroseed application.

Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.

B. Apply slurry uniformly to all areas to be seeded. Rate of application as required to obtain specified seed sowing rate.

3.4 SCHEDULE OF SEEDING MIXTURE REQUIREMENTS

A. MULCHING

All permanent seeding must be mulched immediately upon completion of seed application. Refer to the latest edition of the Virginia Erosion and Sediment Handbook, MULCHING. Std. & Spec. 3.35.

B. SEEDING MIXTURES

Refer to "Permanent Seeding", Chapter 3.32 of the Virginia Erosion and Sediment Control Handbook, Latest Edition for recommended seed mixtures based on geographic location.

3.5 SODDING

A. Sod shall not be laid on surfaces that are frozen.

B. During periods of high temperature, the soil shall be lightly irrigated immediately prior to laying the sod, to cool the soil and reduce root burning and dieback.

C. The first row of sod shall be laid in a straight line with subsequent rows placed parallel to and butting tightly against each other. Lateral joints shall be staggered to promote more uniform growth and strength. Care shall be exercised to ensure that sod is not stretched or overlapped and that all joints are butted tight in order to prevent voids which would cause

drying of the roots.

D. On slopes 3:1 or greater, or wherever erosion may be a problem, sod shall be laid with staggered joints and secured by stapling or other approved method. Sod shall be installed with the length perpendicular to the slope (on the contour).

E. As sodding is complete, area shall be rolled or tamped to provide firm contact between roots and soil.

F. After rolling, sod shall be irrigated to a depth sufficient that the underside of the sod pad and the soil 4 inches below the sod is thoroughly wet.

G. Until such time that a good root system is developed, in the absence of adequate rainfall, watering shall be performed as often as necessary to maintain moist soil to a depth of at least 4 inches.

H. The first mowing shall not be attempted until the sod is firmly rooted, usually 2-3 weeks after installation. No more than one third of the grass leaf shall be removed at any one cutting.

3.6 MAINTENANCE

Begin maintenance immediately after planting. Maintenance by the Contractor shall continue until turf is accepted by the Town.

3.7 LAWN RENOVATION

A. Renovate existing lawn damaged by Contractor's operations.
Re-establish lawn where settlement or washouts occur or where minor re-grading is required.

B. Remove topsoil containing foreign materials resulting from CONTRACTOR's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.

C. Lawns shall be evaluated at the end of the maintenance period to ensure that a healthy, uniform, close stand of grass has been established, free from weeds and surface irregularities, with coverage exceeding 90% over any 10 sq. ft. area, and bare spots not exceeding 4 inches square.

3.8 CLEAN UP AND PROTECTION

A. Soil and debris generated from lawn work shall not be stored directly on adjoining pavement or concrete surfaces, unless surface is protected with poly-sheeting, tarpaulins, or other protective material. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas

B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after lawn is established.

C. Remove erosion controls measures are required in Section 312500.

PART 4 - MEASUREMENT AND PAYMENT

A. Sodding work shall be calculated for restoration areas within private property and included as part of the lump sum.

B. Seeding and mulching shall be calculated for restoration of grass areas within the right-of-way, not otherwise landscaped, and included as part of the lump sum.

C. All other plantings not specifically listed in Part 4A or B shall be included as part of the lump sum.

END OF SECTION

SECTION 334000

STORM DRAINAGE SYSTEMS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work specified in this section.

1.2 DESCRIPTION OF WORK:

Replacement of existing and installation of new drainage structures and pipes is shown on plans. Installation and connection of area drains, as shown on plans.

1.3 QUALITY ASSURANCE:

Manufacturer's Qualifications - Firms regularly engaged in manufacturer of storm drainage system products of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.4 CODES AND STANDARDS:

A. Virginia Department of Transportation Road and Bridge Standards, latest edition.

B. Virginia Department of Transportation Road and Bridge Specifications, latest edition.

C. Fairfax County Public Facilities Manual, latest edition.

1.5 SUBMITTALS:

Product Data - Submit manufacturer's technical product data, shop drawings and installation instructions for storm sewage system materials and products.

PART 2 – PRODUCTS

2.1 PIPES AND PIPE FITTINGS

A. Reinforced Concrete Pipe (RCP) - ASTM C 76, Class IV.

B. Fittings - Reinforced concrete, same strength as adjoining pipe, tongue-and-groove joints complying with ASTM C 443.

C. Polyvinylchloride (PVC) non-pressure pipe and fittings shall be Schedule 40 glued joint.

6.1 DRAINAGE STRUCTURES

A. Standard storm sewer manholes, drainage inlets, and junction boxes shall conform with the details shown in the current Fairfax County Public Facilities Manual, Section 6.

B. Cast-In-Place Concrete shall be in accordance with Section 033000.

PART 3 – EXECUTION

3.1 INSTALLATION OF PIPE, PIPE FITTINGS AND STRUCTURES

A. General - Install piping and structures in accordance with Fairfax County Public Facilities Manual, Section 6 requirements.

B. Inspect piping and structures before installation to detect apparent defects. Mark defective materials with colored paint and promptly remove from site.

C. Lay piping beginning at low point of system, true to grades and alignment indicated, with unbroken continuity of invert.

D. Place bell ends or groove ends of piping facing upstream. Install gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and special installation requirements.

E. Cleaning Piping - Clear interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag in line and pull past each joint as it is completed.

F. Place plugs in ends of uncompleted pipe lines at end of day or whenever work stops.

G. Flush lines between manholes if required to remove collected debris. Debris shall be collected from the structures and shall not be allowed to enter the existing system.

H. Joint Adapters - Make joints with standard manufactured adapters and fittings supplied by pipe manufacturer.

I. Interior Inspection - Inspect piping to determine whether line displacement or other damage has occurred.

J. Make inspections after lines between structures, or structure locations have been installed and approximately 2 feet (600mm) of backfill is in place and again at completion of project.

K. If inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects, correct such defects and re-inspect at no cost to the Town of Herndon.

L. Install erosion controls in accordance with Section 02270.

3.2 BACKFILLING:

A. Conduct backfill operations of open-cut trenches closely following laying, jointing, and bedding of pipe, and after initial inspection and testing are completed.

B. Backfill in accordance with Virginia Department of Transportation Road and Bridge Standard Specifications requirements and Section 312000 of these specifications.

PART 4 - MEASUREMENT AND PAYMENT

A. Storm Drainage System work shall be included as part of the lump sum.

END OF SECTION

SECTION 334200

CULVERTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work specified in this section.

1.2 DESCRIPTION OF WORK:

This section shall include construction specifications and standards and for High Density Polyethylene (HDPE) corrugated and smooth lined pipe materials for the construction of pipes and/or culverts, along with connections and fittings. The pipes shall be of the sizes, types, and dimensions shown on the plans, and contained in this specification. In addition, it shall include all connections and joints to new or existing pipes, storm sewer manholes, inlets, headwalls, and other appurtenances as may be required to complete the work.

1.3 QUALITY ASSURANCE:

The contractor shall verify the material based on the manufacturer's specifications, specifications as listed in all sections of the plans and specifications and shall comply with all VDOT specifications and standards.

1.4 SUBMITTALS

Manufacturers' Literature and Data shall be submitted, as one package, for pipes, fittings and appurtenances, including jointing materials, and other miscellaneous items.

PART 2 - PRODUCTS

Unless otherwise specified on the plans or herein, thermoplastic pipe and joint fittings shall conform to the following:

A. High Density Polyethylene (HDPE) Corrugated and Smooth Lined Pipe & Fittings shall be manufactured in accordance with requirements of ASTM F 2306, latest edition. Type S: This pipe shall have a full circular cross section, with an outer corrugated pipe wall and a smooth inner wall.

B. High Density Polyethylene (HDPE) Corrugated and Smooth Lined Pipe shall be manufactured from virgin PE compounds which conform with the requirements of cell

class 435400C as defined and described in ASTM D 3350.

C. Minimum Pipe Stiffness (PS) at five percent deflection shall be as described in ASTM F 2306, Section 6.3 when tested in accordance with ASTM D 2412.

D. All HDPE Corrugated and Smooth Lined Pipe shall be certified through the AASHTO National Transportation Product Evaluation Program (NTPEP) 3rd Party Certification program.

PART 3 - EXECUTION

Installation shall be in accordance with ASTM D 2321, "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications".

Contractors shall be trained and certified by the manufacturer prior to installing HDPE pipe. A copy of the training certification and proof of insurance shall be provided to the Town before any work shall commence.

Details of the culvert typical section can be located on the construction plans and profiles.

A. General Installation Requirements:

Thermoplastic pipe shall be unloaded and handled with reasonable care. Pipe shall be placed in the bed starting at the downstream end. Trenches shall be excavated in such a manner as to insure that the trench sidewalls will be stable under all working conditions.

Trench walls shall be sloped or supported in conformance with generally accepted standards of safety, including VDOT Standards and Specifications. Only as much trench as can be safely maintained shall be opened. Trenches with thermoplastic pipe in place shall be backfilled as soon as practicable, but no later than the end of each working day.

Trench details, including foundation, bedding, initial backfill, final backfill, pipe zone, and trench width are shown in the construction plans.

B. Trench Widths:

Trench width shall be in accordance with ASTM D2321 and shall be sufficient to ensure working room to properly and safely place and compact and other backfill materials. Minimum trench width shall not be less than 1.25 times the pipe outside diameter plus 12 inches, (1.25 x O.D. + 12"). On multiple pipe barrel runs the clear distance between pipes shall be 0.50 times the pipe diameter, (½ x Diameter).

C. Bedding and Backfill:

Bedding material shall meet the requirements of VDOT Standards and Specfications, with the placement of #57 base material. A minimum of 6" of bedding shall be provided prior

to placement and shall be loosely compacted. Bedding material size shall be 1½" maximum granular material. Initial backfill material shall meet the same requirements as the bedding material and shall extend to 6 inches above the top of the pipe.

Final backfill material shall meet the requirements of VDOT Standards and Specifications 21-A. material. All initial and final backfill material shall be placed in 6 inch lifts and compacted to a minimum 90% Standard Proctor Density. The contractor shall provide density reports and a Proctor on materials.

D. Joints:
Joints shall be installed such that the connection of pipe sections will form a continuous line free from irregularities in the flow line. All installations within the right-of-way shall require watertight joints that meet a 74kPa (10.8 psi) laboratory test per ASTM D3212 and utilize a bell and spigot design with a gasket meeting ASTM F477.

PART 4 – MEASUREMENT AND PAYMENT

Plantings shall be included as part of the lump sum.

END OF SECTION

SECTION 334616

SUBDRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

Drawings and General Provisions of the Contract, including General and Special Conditions and General Requirements apply to the work specified in this section.

VDOT Standards and Specifications, including but not limited to Drainage Design Memorandum.

1.2 DESCRIPTION OF WORK:

This section shall include construction specifications and standards and for subsurface drainage. This section includes, but is not limited to the sub-drainage piping to be provided at the edge of the road shoulder, under trails and sidewalks and any other areas that have been defined with notes, specifications and/or denoted on the plans.

The sub-drainage piping is intended to carry infiltration water away from the proposed location. The pipes shall be of the sizes, types, and dimensions shown on the plans, and contained in this specification. In addition, it shall include all connections and joints to new or existing pipes, storm sewer manholes, inlets, headwalls, and other appurtenances as may be required to complete the work.

1.3 QUALITY ASSURANCE:

The contractor shall verify the material based on the manufacturer's specifications, specifications as listed in all sections of the plans and specifications and shall comply with all VDOT specifications and standards.

1.4 SUBMITTALS

Manufacturers' Literature and Data shall be submitted, as one package, for pipes, fittings and appurtenances, including jointing materials, fabrics to be placed around the pipes and other miscellaneous items.

PART 2 - PRODUCTS

Standard EW-12 shall be used at outlet ends of all underdrains which do not tie to other drainage structures (inlets, manholes, etc.).

Materials shall conform to the latest edition of Virginia Department of Transportation (VDOT) standards and specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.

B. If subdrainage is required for landscaping, locate and mark existing utilities, underground structures, and aboveground obstructions before beginning installation and avoid disruption and damage of services.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EARTHWORK

Excavating, trenching, and backfilling are specified in Division 312000 Section "Earth Moving", Division 321100 Section “Base Courses” and any other special conditions or other sections as listed in these specifications.

3.3 PIPING APPLICATIONS

A. Underground Subdrainage Piping:

1. Perforated PE pipe and fittings, couplings, and coupled joints.

B. Header Piping:

1. PE drainage tubing and fittings, couplings, and coupled joints

3.4 CLEANOUT APPLICATIONS

A. In Underground Subdrainage Piping:

1. At Grade in Earth: PVC cleanouts.
2. As described in the VDOT Standards and Specifications

3.5 PIPING INSTALLATION

A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.

1. Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 1.0 percent.
2. Retaining-Wall Subdrainage: When water discharges at end of wall into stormwater piping system, install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 36 inches, unless otherwise indicated. However, when water discharges through wall weep holes, pipe may be installed with a minimum slope of zero percent.
3. Landscaping Subdrainage: Install piping pitched down in direction of flow, at a minimum

slope of 0.5 percent and with a minimum cover of 36 inches, unless otherwise indicated.

4. Lay perforated pipe with perforations down.
5. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.

B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

C. Install PE piping according to ASTM D 2321.

3.13 FIELD QUALITY CONTROL

Testing: After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

3.14 CLEANING

Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

PART 4 – MEASUREMENT AND PAYMENT

Plantings shall be included as part of the lump sum.

END OF SECTION

StormTrap Guide Specification

StormTrap 2
SingleTrap on Aggregate Foundation
Groundwater BELOW Invert
Revised 08/24/2020

This product guide specification is written according to the Construction Specifications Institute (CSI) 3-Part Format, including *MasterFormat, SectionFormat,* and *PageFormat,* contained in the CSI *Manual of Practice.*

The section must be carefully reviewed and edited by the Engineer to meet the requirements of the project and local building code. Coordinate this section with other specification sections and the Drawings. Delete all "Specifier Notes" when editing this section.

Section numbers are from *MasterFormat 2016 Edition*. Update section numbers to versions if required.

Specifier Notes: This section covers "StormTrap®" precast concrete, modular, storm water detention/retention. StormTrap is custom designed to meet the specific requirements of the project.

Consult StormTrap for assistance in editing this section for the specific application.

SECTION 33 46 23 – MODULAR BURIED STORMWATER STORAGE UNITS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. StormTrap Precast concrete, modular stormwater detention/retention.

1.02 RELATED SECTIONS

A. Section 31 00 00 – Earthwork

B. Section 03 40 00 – Precast Concrete

1.03 REFERENCE STANDARDS

A. AASHTO – Standard Specifications for Highway Bridges – Seventh (7^{th}) Edition

B. ACI 318 - Building Code Requirements for Structural Concrete.

C. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

D. ASTM C 857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.

E. ASTM C 858 - Standard Specification for Underground Precast Concrete Utility Structures.

F. ASTM C 891 - Standard Practice for Installation of Underground Precast Concrete Utility Structures.

G. ASTM C 990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

H. ASTM A 1064 – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

1.04 DESIGN REQUIREMENTS

A. Precast Concrete Modular Stormwater Detention/Retention shall comply with ASTM C 857 and ASTM C 858.

B. Underground precast concrete stormwater management system shall be sized in accordance with the design requirements provided by the Engineer of Record (EOR) and approved by the reviewing agency.

C. The system shall be designed so modules are aligned and have channels that extend to the bottom of the modules allowing for relatively unrestricted fluid flow in both directions.

D. Minimum Structural Design Loading: ASTM C 857.

1. Total Cover:

a. Minimum: As indicated on the drawings.

b. Maximum: As indicated on the drawings.

2. Concrete chamber shall be designed for AASHTO HS-20 wheel load.

3. Minimum Soil Pressure:

    a. SingleTrap Modules: As indicated on the drawings for Aggregate Base.

4. Vertical and lateral soil pressures shall be determined using:

    a. Groundwater: At or below invert of system.

    b. Lateral soil soil pressures:

        1) Equivalent Unsaturated Lateral Active Earth Pressure = 35 psf/ft

        2) Equivalent Saturated Lateral Active Earth Pressure = 80 psf/ft when groundwater is above invert.

    c. Vertical soil pressures:

        1) Live load = AASHTO HS-20 and Dead load = 120 pcf cover fill unit weight

    d. Engineer to verify geotechnical requirements

    e. Lateral Seismic Surcharge loading provided by project Engineer of Record. Modules shall be designed without seismic surcharge loading when seismic information is not provided by project Engineer of Record

1.05 QUALITY ASSURANCE

A. The manufacture of the concrete modules shall be performed at a precast production facility certified by the NPCA or PCI.

1.06 SUBMITTALS

A. Comply with Section 01 33 00 - Submittal Procedures, except shop drawings shall be eleven inches (11”) by seventeen inches (17”).

B. Product Data: Submit manufacturer’s product data and installation instructions.

C. Record Documents:

1. Shop Drawings:

    a. Submit manufacturer’s shop drawings, including plans, elevations, sections, and details indicating layout, dimensions, foundation, cover, and joints.

    b. Indicate size and location of roof openings and inlet and outlet pipe openings.

    c. Indicate sealing of joints.

D. Operation and Maintenance Data: Submit manufacturer’s operation and maintenance instructions

1.07 DELIVERY, STORAGE AND HANDLING

A. Delivery of Accessories: Deliver to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage of Accessories:

1. Store in accordance with manufacturer’s instructions.

2. Store in clean, dry area, out of direct sunlight.

C. Handling: Protect materials during handling and installation to prevent damage.

1.08 WARRANTY

A. The Manufacturer shall provide a minimum five (5) year limited warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. StormTrap, LLC, 1287 Windham Parkway, Romeoville, Illinois 60446. Phone (877) 867-6872. Fax (331) 318-5347. Website www.stormtrap.com.

2.02 STORMWATER DETENTION/RETENTION

A. All material shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

B. Stormwater Detention/Retention Modules:

1. Description: Engineered, precast concrete, modular stormwater detention/retention.

2. Module Type: SingleTrap

3. Size: As indicated on the drawings.

4. Concrete: Manufacturer's Approved Mix design providing a minimum compressive strength of 6,000 psi at 28 days.

5. Reinforcing Bars: ASTM A 615, Grade 60.

6. Reinforcing Mesh: ASTM A 1064, Grade 80.

7. Cover for Reinforcing Bars: ACI 318

8. The system shall be designed to comply with ACI 318 Design Standard for applicable Load Combination Factors and Design Capacities.

2.03 AGGREGATE STONE FOUNDATION (PROVIDED BY CONTRACTOR)

A. Stone base foundation shall be properly installed and compacted in accordance with the manufacturers drawings.

1. Minimum soil bearing capacity supporting (below) the aggregate foundation shall be as indicated on the drawings and shall be verified in the field by others.

2. Aggregate Foundation shall extend a minimum of 2'-0" past the outside of the system footprint as indicated on the drawings.

3. The Aggregate Foundation shall be properly compacted and seated and will consist a minimum of:

a. Topping Course is a 3" thick bed of ¾" angular washed stone with no fines.

b. Base Course thickness is as indicated on the drawings of 3" angular stone with no fines

4. The above thicknesses the minimum recommendations and a qualified (project) geotechnical engineer shall be used to determine the exact requirements for the locations that the system is to be located.

5. Geoweb filled with concrete shall be provided by the contractor as shown in the drawings.

B. Field conditions and subgrade bearing capacity requirements shall be verified in the field by others or by the project geotechnical engineer.

2.04 ACCESSORIES

A. Joint Wrap:

1. Eight inch (8”) wide self-adhesive elastomeric resin bonded woven puncture resistant polymer wrap.

2. Approved by manufacturer.

B. Geoweb GW30V3 (PROVIDED BY CONTRACTOR)

1. Three inch (3”) tall geoweb.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine area to receive stormwater detention/retention modules. Notify Engineer if area is not acceptable. Do not begin installation until unacceptable conditions have been corrected.

B. Verify in field before installation, dimensions and soils conditions, including groundwater and soil bearing capacity.

3.02 INSTALLATION

A. Install stormwater detention/retention modules in accordance with manufacturer’s instructions and ASTM C 891.

B. Install modules plumb, on line, and to proper elevation.

C. Install modules with a maximum space of three quarters inch (3/4”) between adjacent modules. If the space exceeds three quarters inch (3/4”), the modules shall be reset with appropriate adjustment made to line and grade to bring the space into compliance.

D. SingleTrap:

1. Aggregate Foundation: Place modules on level, compacted aggregate foundation with two foot (2’) overhang as indicated on the drawings.

E. Joint Wrap:

1. Seal exterior joints between adjacent modules with joint wrap in accordance with ASTM C 891.

2. Prepare surfaces and install joint wrap in accordance with manufacturer’s instructions. drawings.

F. Geoweb:

1. Geoweb shall be installed within the top three inches (3”) of the aggregate foundation at inlet pipes as indicated on the drawings.

2. Fill geoweb with three inches (3”) of concrete at inlet pipes as indicated on the drawings.

G. Field Modifications to the modules is strictly prohibited without prior written consent of StormTrap.

H. Excavation and fill shall be as specified in Sections 31 00 00.

I. Fill:

1. Backfill material shall consist of a GW, GP, SW, or SP material as defined by the Unified Soil Classification System and that meets the gradation requirements as indicated on the drawings.

2. Native materials shall be separated from backfill materials with a geotextile filter fabric unless the drawings indicate separation is not required.

3. Deposit fill on both sides of modules at same time and to approximate same elevation.

4. Prevent wedging action against structure by stepping or serrating slopes bounding or within area to be backfilled.

5. Do not disrupt or damage joint wrap during backfilling.

J. Do not use stormwater detention/retention modules that are damaged, as determined by manufacturer.

K. Contractor is responsible for installation in accordance with project plans, specifications, and all federal, state, and local regulations.

END OF SECTION 33 46 23