

SPECIFICATION FOR
ROUGH GRADING PACKAGE
REPLACEMENT FACILITY FOR
SMYTH COUNTY COMMUNITY HOSPITAL
MARION, VIRGINIA
JOB NO. 09033.00
MAY 28, 2010

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control services as specified herein. Following are requirements normally associated with this Section. Not all of the listed requirements may apply to this Project nor are they being represented as being all inclusive of every requirement specified herein.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor, Manufacturer, Fabricator and/or Supplier to provide quality-assurance and -control services required by Architect, Owner, or Authorities Having Jurisdiction are not limited by provisions of this Section.

1.3 RELATED SECTIONS

- A. Following are related Sections that contain additional Contractor requirements. Not all of these listed Sections may apply to this Project nor are they being represented as being all inclusive of every related Section possibly associated with this Section.
 - 1. Section 012100 – Allowances - for testing and inspecting allowances.
 - 2. Section 013200 – Construction Progress Documentation - for developing a schedule of required tests and inspections.
 - 3. Section 017329 – Cutting and Patching - for repair and restoration of construction disturbed by testing and inspecting activities.
 - 4. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.4 REFERENCE STANDARDS

- A. Following are reference standards normally associated with this Section. All of these Standards may not apply to this Project nor are they being represented as being all inclusive of every

reference standard associated with this Section. Refer to Division 00, Section 000800 – Supplementary Conditions, Article 1, concerning version of Standards referenced.

1. American Society For Testing Materials (ASTM) International
 - a. ASTM E 548: Guide for General Criteria Used for Evaluating Laboratory Competence
2. Code of Federal Regulations
 - a. 29 CFR 1910, Subpart A, Section 1910.7: Definition and Requirements for a Nationally Recognized Testing Laboratory (NRTL)
3. This specification shall be supplemented by any applicable federal, state and local building codes, guidelines, regulations and standards adopted in the immediate geographic area of the Project; insurance rating organizations; including all other Authorities Having Jurisdiction.

1.5 DEFINITIONS

- A. Quality: Project requirements established in the Contract Documents.
- B. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- C. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work, and completed activities and elements of the design comply with requirements. Services do not include contract enforcement activities performed by Architect.
- D. Site Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selection of products/materials made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation. Mockups are not Samples. APPROVED MOCKUPS ESTABLISH THE STANDARD BY WHICH THE WORK WILL BE JUDGED.
- E. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.
- F. Product Testing: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL), a national voluntary laboratory accreditation program (NVLAP), or a testing agency qualified to conduct product testing and acceptable to Authorities Having Jurisdiction, to establish product performance and compliance with industry standards.
- G. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

- H. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e. plant, mill, factory, or shop.
- I. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- J. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- K. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as “carpentry” does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as “carpenter.” It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.
- L. Experienced: When used with an entity, “experienced” means having successfully completed a minimum of five (5) previous projects, unless specified otherwise in individual Specification Sections or are prohibited by law, similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of Authorities Having Jurisdiction.

1.6 STANDARD AND INDUSTRY SPECIFICATIONS

- A. Applicability of Standards: Except where Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents. Such standards are made a part of Contract Documents by reference. Individual Sections indicate which codes and standards Contractor must keep available at the Project Site for reference. Materials or operations specified by reference to the published specifications of a manufacturer, testing agency, society, association, or other published standards shall comply with the requirements in the revision thereof and amendments or supplements thereto in effect as defined in Division 00, Section 000800 – Supplementary Conditions, Article 1.

1.7 MANUFACTURER'S DIRECTIONS

- A. Manufactured articles, materials, and equipment shall be utilized as directed by the manufacturers unless herein specified to the contrary. Discrepancy between an installation required by the Contract Documents and the manufacturer's instructions and recommendations shall be resolved by the Architect before the work may proceed.
- B. Contractor shall, if requested, furnish an affidavit from the manufacturer certifying that materials or products being furnished meet specified requirements. However, such certification shall not relieve Contractor from responsibility for complying with other requirements of Construction Documents.

1.8 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement unless the Contract Documents indicate otherwise. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to Architect for a decision before proceeding with the work.
- B. Conflicting requirements between Contract Documents and referenced standards, codes, laws, or regulations shall be governed by the most stringent requirement, unless otherwise determined in writing by the Architect.
- C. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.9 SUBMITTALS

- A. Informational Submittals:
 - 1. Qualification Data: For testing agencies specified in “Quality Assurance” Article below, to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized Authority.
 - 2. Special Inspector Qualifications: For Special Inspector specified in “Special Tests and Inspections” Article below, to demonstrate their capabilities and experience. Include proof of qualifications in the form of a certification letter or letter detailing the individual’s inspection experience and qualifications by a recognized authority.
 - 3. Schedule of Tests and Inspections: Prepare information in tabular form including, but not necessarily limited to, the following:
 - a. Specification Section number and title
 - b. Description of tests and inspections
 - c. Identification of applicable standards
 - d. Identification of test and inspection methods
 - e. Number of tests and inspections required
 - f. Time schedule or time span for tests and inspections
 - g. Entity responsible for performing tests and inspections
 - h. Requirements for obtaining samples
 - i. Unique characteristics of each quality-control service
 - 4. Reports: Prepare and submit certified written reports that include, but not necessarily limited to, the following:
 - a. Date of issue
 - b. Name, address, and telephone number of testing agency
 - c. Project title and number
 - d. Project Contractor

- e. Material Supplier
 - f. Dates, time, and locations of samples and tests or inspections
 - g. Names of individuals making tests and inspections
 - h. Quantity Represented
 - i. Description of the Work and test and inspection method
 - j. Identification of product and Specification Section
 - k. Complete test or inspection data
 - l. Test and inspection results and an interpretation of test results
 - m. Record of temperature and weather conditions at time of sample taking and testing and inspecting
 - n. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements
 - o. Name and signature of laboratory inspector
 - p. Recommendations on retesting and reinspecting
5. Permits, Licenses, and Certificates: For Owner's records, submit through Architect, copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.10 OWNER RESPONSIBILITIES RELATIVE TO TESTING AND INSPECTION SERVICES

- A. Owner will engage a qualified testing agency to perform quality-assurance and quality-control testing, and quality-control inspection services, unless specified otherwise.
- 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. The Owner will compensate testing agencies for approved costs associated with all testing and inspection services related to the Work as required by the Contract Documents, and any special testing and inspection services that may be required by Authorities Having Jurisdiction as being Owner's responsibility, unless specifically specified herein and/or in individual Specification Sections as being Contractor's or Manufacturer's/Fabricator's/Supplier's responsibility. Approved costs are those covered within the predetermined guidelines, unit-costs and monetary limits outlined in the Testing and Inspection Cost Proposal prepared by the testing agency and submitted directly to the Architect for approval prior to the Work.
 - a. Testing and inspection costs include the cost of engaging any independent testing agency or independent inspector, actual tests and inspections, and reporting results of same.
 - b. Testing and inspection costs do NOT include incidental labor required to assist the testing agency or independent inspector. The cost for such incidental labor shall be included in the Contract Sum.
 - c. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents are not included in costs designated as Owner's responsibility. The Owner will pay for such extra tests and inspections but will deduct the amounts of such payments from payments due to

the Contractor. Additional work for the Architect shall be at the rate of 2.5 times direct personnel expense plus the cost of direct expense.

- d. Costs of testing and inspection services not required by the Contract Documents are not included in costs designated as Owner's responsibility.

1.11 CONTRACTOR RESPONSIBILITIES RELATIVE TO TESTING AND INSPECTION SERVICES

- A. Contractor will engage a qualified testing agency to perform only quality-assurance and quality-control testing, and quality-control inspection services explicitly specified herein, or in individual Specification Sections as being the Contractor's responsibility.
 1. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 2. Notify testing agencies at least 24-hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Coordinate all Work that requires testing to maximize use of testing agency during any particular site visit or testing period.
 4. The Contractor will compensate testing agencies for costs associated with testing and inspection services related to the Work as specified herein and/or in individual Specification Sections as being Contractor's or Manufacturer's/Fabricator's/Supplier's responsibility, and any special testing and inspection services that may be required by Authorities Having Jurisdiction as being Contractor's responsibility.
 5. Testing and inspecting services requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit one (1) copy of each certified written report of each test, inspection, and similar service to the Authorities having Jurisdiction, as required.

1.12 TESTING AGENCY RESPONSIBILITIES RELATIVE TO TESTING AND INSPECTION SERVICES

- A. During the performance of quality-assurance and quality-control testing services, quality-control inspection services, and any required special testing and inspection services, provide qualified personnel to perform required tests and inspections.
 1. Cooperate with Architect and Contractor in performance of duties.
 2. In conjunction with the Architect, determine the location from which test samples will be taken and in which in-situ tests are conducted. In no case shall the vendor be considered a representative of the Architect for this purpose.
 3. Transport test samples from construction site to testing facilities.
 4. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the requirements of the Contract Documents.
 5. Notify Architect and Contractor within 24-hours of tests and/or observations of irregularities or deficiencies observed in the Work during performance of its services.
 6. Submit one (1) copy of each certified written report of each test, inspection, and similar service to the Architect, one (1) copy in duplicate to the Owner's representative, two (2) copies in duplicate to the Contractor, and additional copies to other entities as required.

7. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
8. Do not advise or direct the Contractor in how to perform his Work.
9. Do not perform any duties of the Contractor.

1.13 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections may specify additional qualifications requirements.
- B. Maintain one copy each of all referenced standards and specifications pertaining to each Specification Section on site.
- C. Installer/Applicator/Erector Qualifications: Manufacturer's /Fabricator's /Supplier's authorized representative, being a firm or shop of skilled tradesmen, or skilled individual, trained and approved by manufacturer/fabricator/supplier, each of whom must possess specified experience in successfully installing, applying, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance, and who agrees to employ only skilled tradesmen for the Work
 1. Only qualified journeypersons, as defined by Local Jurisdiction shall be engaged in the installation of the Work. Apprentices may be employed provided they work under the direct supervision of a qualified journeyperson in accordance with trade regulations.
- D. Manufacturer Qualifications: A firm or shop, experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Fabricator Qualifications: A firm, shop or individual, experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- F. Supplier Qualifications: A recognized, qualified direct factory-contract distributor of products experienced in successfully supplying products or systems similar to those indicated for this Project, and with a record of successful in-service performance. Supplier to have sufficient warehouse facilities of minimum capacity to supply specified units to extent of those required for this Project.
- G. Professional Engineer Qualifications: A professional engineer who is legally qualified (licensed) to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind required.
 1. Engineering services are defined as those functions performed for and during design and installation of the system, assembly, or product that are, or similar to, those indicated for this Project in material, design, and extent.
- H. Specialists: Certain Sections of the Specifications may require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities

indicated. Requirement for specialists shall not supersede building codes and regulations governing the Work.

- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Testing Laboratory Qualifications: To qualify for acceptance, an independent testing laboratory must demonstrate to the Architect's satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM E 699, that it has the experience and capability to conduct satisfactorily the testing indicated without delaying the progress of the Work.
- K. Testing Agency Qualifications: A nationally recognized testing laboratory (NRTL), a national voluntary laboratory accreditation program (NVLAP), or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by Authorities Having Jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program
- L. Preconstruction Testing: Where testing agency is indicated to perform quality-assurance (preconstruction) testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities, in addition to those specified in "Contractor's Responsibilities For Testing And Inspection Services" Article above, include the following:
 - a. Provide material for specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups. Do not reuse actual tested products on project unless allowed by individual Specification Sections or directed by the Architect.
- M. Mockups: Before installing portions of the Work requiring a mockup(s), build mockup(s) for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockup(s) in location and of size indicated or, if not indicated, as directed by the Architect.

2. Notify Architect a minimum of fourteen (14) calendar days in advance of dates and times when mockup(s) will be constructed and completed for observation.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's written approval of mockup(s) before starting work, fabrication, or construction. Allow a minimum of fourteen (14) calendar days for initial review and each re-review of each mockup.
5. Maintain mockup(s) during construction in an undisturbed condition as a standard for judging the completed Work.
6. Mockup(s) may become part of the actual construction only when allowed in the individual Specification Sections.
7. When mockup(s) is not to become part of the actual construction, demolish and remove mockup(s) at end of construction phase, and only when directed by the Architect, unless otherwise indicated.
8. APPROVED MOCKUPS ESTABLISH THE STANDARD BY WHICH THE WORK WILL BE JUDGED.
9. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

- N. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Sections in Divisions 02 through 33.

1.14 QUALITY CONTROL

- A. Retesting/Reinspecting: Regardless of whether original tests or inspections are Owner's or Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that will replace Work found to be nonconforming with the Contract Documents.
- B. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01, Section 013300 – Submittal Procedures.
- C. Manufacturer/Fabricator/Supplier Requirements: Provide direct trained company personnel who can speak fluent English, attend necessary job meetings, perform periodic inspections as necessary, and conduct a final inspection upon successful completion of the project.
- D. Installer/Applicator/Erector Requirements: Provide direct trained company personnel who can speak fluent English, install building materials of their trade properly and proficiently, attend necessary Project meetings, and is designated by the Company to have the authority to make final decisions.
- E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.

3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 6. Security and protection for samples and testing/inspecting equipment at Project site.
- F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting. Schedule times for tests, inspections, obtaining samples, and similar activities.
- G. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit Schedule concurrently with Contractor's Construction Schedule, Submittal's Schedule, and Schedule of Values prior to commencement of the Work. Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.15 SPECIAL TESTS AND INSPECTIONS

- A. Owner will engage a qualified special inspector to conduct special tests and inspections that may be required, including any required by Authorities Having Jurisdiction as the responsibility of Owner, as indicated in individual Specification Sections, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to Authorities Having Jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 ACCEPTABLE TESTING AGENCIES

- A. Submit list of firms proposed to perform designated tests and inspections to Owner, with a duplicate copy to the Architect, for review and approval. The Architect will make recommendation of preferred testing agencies to the Owner.

3.2 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections containing pertinent information, including but not necessarily limited to, date test or inspection was conducted; description of the Work tested or inspected; date test or inspection results were transmitted to Owner and Architect; identification of testing agency or special inspector conducting test or inspection.
- B. Maintain Log at Project site. Post changes and modifications as they occur. Provide access to Test and Inspection Log for Owner's reference during normal working hours.

3.3 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes. Comply with the Contract Document requirements for Division 01, Section 017329 – Cutting and Patching.
- B. Protect construction exposed by or for quality-control service activities. Repair and protection of exposed construction are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 312021 – EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 INTENT

- A. The main concern associated with erosion on a construction site is the movement of sediment off site and its impact on water quality. It is the Owner's intent that the Contractor install and maintain sufficient erosion control practices to retain sediment within the boundaries of the site in addition to complying with regulatory authorities having jurisdiction and local erosion and sedimentation control laws and ordinances. All erosion and sediment control methods and devices used shall conform to the latest requirements imposed by federal, state and local authorities. The Contractor shall be responsible for repair of any damage caused and shall be financially responsible for any penalties imposed.
- B. It shall be the Contractor's responsibility to review the erosion and sediment control drawings that have been included in the site construction drawings, prepared by the engineer, prior to implementation.

1.2 SUMMARY

- A. Work under this section shall include but not be limited to, installation and maintenance of both temporary and permanent soil erosion control measures, slope protection and stabilization measures, protection of all surface water and property both on and off site. This work shall include all labor, materials, and equipment necessary to meet all applicable requirements and as specified in the contract documents.

1.3 REFERENCE STANDARDS

- A. All applicable standards and requirements of all regulatory authorities having jurisdiction, including local Soil and Water Conservation district agencies.

1.4 QUALITY ASSURANCE

- A. Soil erosion and sediment control measures shall be implemented in accordance with the requirements and procedures outlined in this specification, contract drawings and documents, state standards or guidelines for soil erosion and sediment control, and all regulatory authorities having jurisdiction. Where conflict between requirements exist, the more restrictive rules shall govern.
- B. The Contractor shall provide all temporary control measures shown on the drawings, or as directed by the Owner, Owner's representative, or soil conservation district for the duration of the contract. Erosion and sediment control drawings are intended to be a guide to address the stages of work shown. Additional measures not specified on the drawings may be necessary and shall be implemented to address intermediary stages of work and any conditions that may develop during construction at no cost to the Owner.

- C. Temporary control provisions shall be coordinated with permanent erosion control features to the extent practical to assure economical, effective and continuous erosion and sediment control throughout the construction and post-construction period.
- D. Soil erosion and sediment control measures shall at all times be satisfactory to the Owner's Representative. Owner's Representative will inform the Contractor of unsatisfactory construction procedures and operations if observed. If the unsatisfactory construction procedures and operations are not responded to and corrected within 48 hours, the Owner's Representative may suspend the performance of any or all other construction until the unsatisfactory condition has been corrected. Such suspension shall not be the basis of any claim by the Contractor for additional compensation nor for an extension of time to complete the work. Any complaints, fines, etc. relating to ineffective erosion control, shall be the sole responsibility of the Contractor.
- E. The Contractor shall inspect all soil erosion and sediment control measures at least at the beginning and end of each day to ascertain that all devices are functioning properly during construction. Maintenance of all soil erosion and sediment control measures on the project site shall be the responsibility of the Contractor until final stabilization is complete, and until the permanent soil erosion controls are established and in proper working condition.
- F. The Contractor shall protect adjacent properties and watercourses from soil erosion and sediment damage throughout construction.

1.5 SEQUENCE OF CONSTRUCTION

- A. The approved construction sequence, as permitted/approved shall be adhered to during the execution of work under this section. All soil erosion and sediment control measures shall be installed in accordance with the phasing sequence shown on the contract documents.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Contractor shall provide all materials necessary to perform the work.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. The Contractor shall comply with and implement the Stormwater Pollution Prevention Plan provided in the contract documents.
- B. Review the soil erosion and sediment control drawings as they apply to current site conditions. Any deviation from the drawings must be submitted for approval to the site engineer in writing at least 72 hours prior to commencing that work.

- C. Notify authority having jurisdiction, in writing at least 72 hours (or sooner if required by local regulations) prior to initial land disturbance.
- D. All Phase I soil sediment and erosion control devices shall be in place prior to any land disturbing activity, in their proper sequence, and maintained until permanent protection is established.
- E. The limit of the area of any earthwork operations in progress shall be commensurate with the Contractor's capability and progress in keeping the finished grading, mulching, seeding and other such permanent control measures current and in accordance with the accepted schedule for construction phasing. Should seasonal limitations make such coordination unrealistic, as determined by the Owner's Representative, temporary erosion control measures shall be provided immediately by the Contractor at no expense to the Owner.
- F. Temporary erosion control measures shall be used to correct conditions which develop during construction that are needed prior to installation of permanent control features, or that are temporarily needed to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.
- G. The Contractor shall incorporate all permanent erosion control features (stabilization) into the project at the earliest practical time to minimize the need for temporary controls.
- H. A temporary construction entrance pad shall be installed and maintained at any point where construction vehicles enter a public right-of-way, street or parking area. The pad shall be used to eliminate mud from the construction area onto public right-of-way. The pad shall be constructed as shown on the drawings. Any mud or debris tracked on streets shall be cleaned up immediately.
- I. Any disturbed or stockpiled areas that will be left exposed more than 14 days or less according to State NPDES General Stormwater Permits shall immediately receive temporary or permanent seeding. Mulch/straw shall be used if the season prevents the establishment of a temporary cover. Disturbed areas shall be limed and fertilized prior to temporary seeding.
- J. Permanent vegetation shall be established as specified on all exposed areas within 14 days or less according to State NPDES General Stormwater Permits after final grading. Mulch as necessary for seed protection and establishment. Lime and fertilize seedbed prior to permanent seeding.
- K. Slopes shall be permanently seeded and mulched as the excavation or fill proceeds to the extent possible. Slopes that erode easily shall be temporarily seeded and mulched. Any slopes steeper than 3:1 or steeper or as indicated on drawings shall be protected with stabilization fabric per specifications and construction drawings.
- L. All storm drainage outlets must be stabilized, as specified, before the discharge points become operational. Equip all inlets with inlet protection immediately upon construction.
- M. Discharge from de-watering operations for the excavated areas shall not be directed to surface waters without first properly removing the suspended sediment through filtration and/or settlement. The Contractor shall obtain any required permits associated with dewatering activities.

- N. The quantity of silt fence to be installed will be affected by the actual conditions that occur during the construction of the project. Silt fence shall be installed at locations shown on the drawings and any additional locations necessary for proper sediment control. The Contractor shall maintain the silt fence until the project is stabilized and shall remove and dispose of the silt fence and silt accumulations when 1/3 the height of the fence is reached.
- O. Soil erosion and sediment control shall include but not be limited to the approved measures. The Contractor shall be responsible for providing all additional measures that may be necessary to accomplish the intent of the drawings.
- P. Comply with all other requirements of authorities having jurisdiction.

END OF SECTION 312021

SECTION 312230 - SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Protecting existing trees and vegetation to remain.
 - 2. Protecting existing pinnacle rock to remain.
 - 3. Removing trees and other vegetation.
 - 4. Clearing and grubbing.
 - 5. Topsoil stripping.
 - 6. Removing above-grade site improvements.
 - 7. Disconnecting, capping or sealing, and abandoning site utilities in place.
 - 8. Disconnecting, capping or sealing, and removing site utilities.

1.2 MATERIALS OWNERSHIP

- A. Except for materials indicated to be stockpiled or to remain on Owner's property, cleared materials shall become Contractor's property and shall be removed from the site.

1.3 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
- B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. Notify utility locator service for area where Project is located before site clearing.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory Soil Materials: As specified in Division 2 Section "Earthwork."
 - 1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TREE PROTECTION

- A. Erect and maintain a temporary fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.
- B. Do not excavate within drip line of trees, unless otherwise indicated.
- C. 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, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
- D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Engineer.

3.3 UTILITIES

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
- B. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted. Arrange to provide temporary utility services.
- C. Excavate for and remove underground utilities indicated to be removed.

3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material as indicated in Section 2300-"Earthwork."

3.5 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

3.6 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

3.7 DISPOSAL

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

END OF SECTION 312230

SECTION 312300 - EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Preparing subgrades.
 - 2. Excavating and backfilling.
 - 3. Subbase course for concrete walks and pavements.
 - 4. Base course for asphalt paving.

1.2 DEFINITIONS

- A. Backfill: Soil materials used to fill an excavation.
- B. Base Course: Layer placed between the subgrade and asphalt paving.
- C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Excavation: Removal of material encountered above subgrade elevations.
 - 1. Additional Excavation: Excavation below subgrade elevations as directed by Engineer. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.
- F. Fill: Soil materials used to raise existing grades or to replace unsuitable material.
- G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- H. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below base, drainage fill, or topsoil materials.
- I. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services.

1.3 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils:
 - 1. On Site Soils: The on-site soils excavated are considered suitable to be used for structural fill, with care. The structural fill shall be clean soil free of organics, trash, and other deleterious matter, containing no rock fragments greater than 6 inches in any one dimension. Structural fill shall have a plasticity index (PI) of 30 percent or less and a maximum dry density of 90 pounds per cubic foot (pcf). All material to be used as structural fill shall be tested and approved by the geotechnical engineer before being placed.
 - 2. Weathered Shale or other Degradable Rock materials: Variable weathered shale or other degradable rock materials shall be reduced to a soil/gravel gradation during compaction to prevent degradation when exposed to water.
 - 3. Shot Rock Fill: Shot-rock fill consists of limestone or dolomite rock with minimal soil fines. Shot-rock fill shall not be used in areas where deep foundations are proposed nor placed in the upper 10 feet or within the areas where utility excavations are planned. Shot-rock fill shall have a maximum particle size of 2 feet in its greatest dimension and shall not have more than 10 percent by weight of soil sized particles.
- C. Fill: Satisfactory soils.
- D. Backfill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57 or Size 67 clean graded aggregate with 100 percent passing a 1-1/2- inch sieve and 0 to 5 percent passing a No. 8 sieve..
- E. Base: Base material shall be as specified on the construction plans.
- F. Bedding: Bedding material shall be as specified on the construction plans and in accordance with the Virginia Department of Transportation (VDOT) standards and specifications.
- G. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57 or Size 67 clean graded aggregate with 100 percent passing a 1-1/2- inch sieve and 0 to 5 percent passing a No. 8 sieve.
- H. Detectable Warning Tape: Polyethylene film warning tape encasing a metallic core, minimum 6-inches wide and 4-mils thick, continuously inscribed with a description of the utility.

- I. Subbase: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2- inch sieve and not more than 12 percent passing a No. 200 sieve

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, freezing temperatures or frost, and other hazards created by earthwork operations. Provide protective insulating materials as necessary.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways
- C. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- D. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

3.2 EXCAVATION

- A. Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.
 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials, replace with satisfactory soil materials.
- B. Excavate for structures, pavements, and walks to indicated elevations and dimensions. Trim bottoms to required lines and grades to leave solid base to receive other work.
 1. Comply with all OSHA requirements, as applicable.
- C. Excavate utility trenches to indicated gradients, lines, depths, and invert elevations of uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12-inches higher than top of pipe or conduit.
 1. Excavate trenches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe if necessary.
- D. Scarify and recompact the upper nine inches of soil exposed in cut sections to create a blanket of less permeable material.
- E. Prior to placement of structural fill at the site or once design grade is achieved in cut areas, the site soils shall be evaluated by the geotechnical engineer through proof rolling. Proof roll subgrades with a loaded, tandem axle dump truck or other pneumatic tired construction equipment of similar weight to identify soft pockets and areas of excess yielding. The proofrolling equipment shall make at least four passes over each section, with the last two

passes perpendicular to the first two. Do not proof roll wet or saturated subgrades. Proofrolling may be required multiple times within the same area, depending on climatic conditions and the speed of contractor operations. Areas judged to perform unsatisfactorily by the geotechnical engineer shall be remediated at the geotechnical engineer's direction as follows:

1. Undercut poor subgrade soils to expose competent soils and then backfill with compacted soil fill to planned subgrade levels.
 2. Undercut poor subgrade soils to a depth sufficient to allow the placement of a "bridging layer" of soil or stone backfill upon which an interval of compacted soil fill can be constructed for pavement subgrade support.
 3. Undercut poor subgrade soils 2 to 3 feet below the pavement subgrade elevation and then place a high-modulus geotextile and/or a layer of aggregate for stabilization.
 4. Undercut poor subgrade soils 1 to 2 feet below the pavement subgrade elevation and then place a non-woven geotextile and one or more layers of biaxial geogrid in combination with aggregate for stabilization.
- F. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities.
- G. Stockpile borrow materials and satisfactory soil materials, without intermixing, in shaped, graded, drained, and covered stockpiles. Stockpile soil materials away from edge of excavations and outside drip line of remaining trees.

3.3 BACKFILLS AND FILLS

- A. Utility Trench Backfill: Place, compact, and shape bedding course to provide continuous support for pipes and conduits over rock and other unyielding bearing surfaces and to fill unauthorized excavations.
1. Place and compact initial backfill to a height of 12-inches over the utility pipe or conduit. Place and compact final backfill to final subgrade.
- B. Fill: Place and compact fill material in layers to required elevations.
- C. Bench fill placed for slopes or within excavations into the adjacent ground. Use care to compact the benched fill and knit the fill into the then existing ground surface.
- D. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 3 percent of optimum moisture content.
1. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 3 percent and is too wet to compact to specified dry unit weight.
- E. Compaction: Place structural fill materials in loose lifts, not more than 8-inches in thickness for material compacted by heavy compaction equipment, and not more than 4-inches in loose depth for material compacted by hand-operated tampers. The soils within the proposed construction

areas shall be compacted in lifts to at least 98 percent of the standard Proctor method (ASTM 698) with a moisture content within 3 percentage points of optimum moisture content as determined from the standard Proctor compaction test.

1. Compact the upper 12 inches beneath grade slabs to a minimum of 100 percent of the soil's maximum dry density per the standard Proctor method and within a range of 3 percent of the optimum moisture content.
 2. Compact the upper 24 inches beneath all paved areas to a minimum of 100 percent of the soil's maximum dry density per the standard Proctor method and within a range of 3 percent of the optimum moisture content.
- F. Shot-Rock Fill: Place rock fill with adequate fines to effectively "choke" the larger rock pieces filling voids and open spaces. The larger shot-rock pieces shall not overlap or be allowed to "nest".
1. Compact shot-rock fill with heavy bulldozers, heavy self-propelled sheepsfoot roller (similar to a Caterpillar 815) or other acceptable equipment and allow visual monitoring by the geotechnical engineer. Compaction equipment shall make 6 to 8 passes in two directions on the fill surface (half the passes in each perpendicular direction) as deemed necessary by the geotechnical engineer.
 2. Do not allow surface water to pond on the fill surface.
 3. At the interface of the shot-rock fill and the soil fill, the shot-rock fill shall be "choked" off properly to prevent migration of the soil particles into the shot-rock fill.
- G. Each lift shall be compacted, tested by geotechnical personnel and approved before placing any subsequent lifts. Any areas which have become soft or frozen shall be removed before additional structural fill is placed.
- H. Before final grading of a fill slope, the edge of the compacted fill shall extend at least 10 feet horizontally beyond the outside edge of the building foundations, beyond areas of proposed future building expansion and beyond paved areas.
- I. Grading: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated. Grade lawns, walks, and unpaved subgrades to tolerances of plus or minus 1-inch and pavements and areas within building lines to plus or minus 1/2inch.
- J. Protect subgrades of floor slabs from excessive drying or wetting by covering the subgrade prior to floor slab construction.
- K. Base Courses: Under pavements, place base course material over subgrade. Compact to required grades, lines, cross sections, and thickness to not less than 98 percent of maximum dry unit weight according to ASTM D 698.

3.4 FIELD QUALITY CONTROL

- A. Allow testing agency to test and inspect subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- B. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.
- C. Perform testing at a frequency of 1 test per 2,500 square feet per lift unless otherwise directed by the geotechnical engineer.

3.5 PROTECTION AND DISPOSAL

- A. Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
- D. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.
- E. END OF SECTION 312300

SECTION 322920 - LAWNS AND GRASSES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes seeding.

1.2 DEFINITIONS

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

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product certificates.
- C. Planting Schedule: Indicating anticipated planting dates.

1.4 QUALITY ASSURANCE

- A. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.
- B. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory.

1.5 DELIVERY, STORAGE, AND HANDLING

PART 2 - PRODUCTS

2.1 SEED

- A. Seed Species: State-certified seed of grass species, as depicted on the construction drawings.

2.2 PLANTING MATERIALS

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1 inch (25 mm) or larger in any dimension and other extraneous materials harmful to plant growth.
1. Topsoil Source: Reuse surface soil stockpiled on-site and supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Verify suitability of stockpiled surface soil to produce topsoil.
 2. Topsoil Source: Amend existing in-place surface soil to produce topsoil. Verify suitability of surface soil to produce topsoil. Surface soil may be supplemented with imported or manufactured topsoil from off-site sources.
- B. Inorganic Soil Amendments:
1. Lime: ASTM C 602, Class T or O, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent.
 2. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum 99 percent passing through No. 6 (3.35-mm) sieve and a maximum 10 percent passing through No. 40 (0.425-mm) sieve.
 3. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
 4. Aluminum Sulfate: Commercial grade, unadulterated.
- C. Organic Soil Amendments
1. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8.
 2. Peat: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with pH range of 3.4 to 4.8.
 3. Peat: Finely divided or granular texture, with pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having water-absorbing capacity of 1100 to 2000 percent.
 4. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil, or toxic materials.
- D. Fertilizer:
1. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 1 percent nitrogen and 10 percent phosphoric acid.
 2. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

3. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - a. Composition: [1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
4. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - a. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

E. Mulches:

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

PART 3 - EXECUTION

3.1 LAWN PREPARATION

- A. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 1. Apply fertilizer directly to subgrade before loosening.
 2. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
 3. Spread planting soil mix to a depth of 6 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
- B. Unchanged Subgrades: If lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare surface soil as follows:
 1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 6 inches of soil. Till soil to a homogeneous mixture of fine texture.
 3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
 4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

- C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 0.10' of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.
- D. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- E. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

3.2 SEEDING

- A. Sow seed at the rates indicated on the construction drawings. Rake seed lightly into top 1/8 inch (3 mm) of topsoil, roll lightly, and water with fine spray.
- B. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre (42 kg/92.9 sq. m) to form a continuous blanket 1-1/2 inches (38 mm) in loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.

3.3 SATISFACTORY LAWNS

- A. Satisfactory Seeded Lawn: Satisfactory seeded lawns consist of a healthy, uniform, close stand of established grass, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm).
- B. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

END OF SECTION 322920

SECTION 332630 - STORM DRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes storm drainage outside the building area.

1.2 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Nonpressure-Piping Pressure Ratings.

1.3 SUBMITTALS

- A. Field quality-control test reports.

1.4 PROJECT CONDITIONS

- A. Site Information: Perform site survey, research public utility records, and verify existing utility locations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPES AND FITTINGS

2.3 Refer to Part 3 "Piping Applications" Article for applications of pipe and fitting materials.

- A. Smooth Interior Corrugated Plastic Pipe (SICP) Shall be ADS-N12 as manufactured by Advanced Drainage Systems, Inc., 3300 Riverside Drive, Columbus, Ohio 43221, (614) 457-3051; or HI-Q Sure-Lock as manufactured by Hancor, Inc., 901 Olive Street, Findlay, Ohio

95840, 1-800-for-pipe; or as manufactured by Lane Enterprises, Inc., 34 Strohm Road, Shippensburg, Pennsylvania 17257 (717) 532-5959.

- B. Polyvinyl Chloride (PVC) Pipe and Fittings: ASTM D3034, SDR 35 for solvent welded or gasketed joints.
- C. Corrugated-Steel Pipe: ASTM A 760, Type I, made from ASTM A 929, zinc-coated steel sheet for banded joints.
 - 1. Fittings: Fabricated to types indicated and according to same standards as pipe.
 - 2. Connecting Bands: Standard couplings made for corrugated-steel pipe to form soiltight joints.
- D. Reinforced-Concrete Sewer (RCP) Pipe and Fittings: ASTM C 76, with groove and tongue ends and sealant joints with ASTM C 990, bitumen or butyl-rubber sealant.

2.4 CURB INLETS / CATCH BASINS / STORM MANHOLES

- A. Normal-Traffic, Precast Concrete Catch Basins: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.
 - 1. Conform to Virginia Department of Transportation (VDOT) standards and specifications.
- B. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for heavy-duty service as specified on the construction plans.

2.5 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318, ACI 350R.
 - 1. Cement: ASTM C 150, Type II.
 - 2. Fine Aggregate: ASTM C 33, sand.
 - 3. Coarse Aggregate: ASTM C 33, crushed gravel.
 - 4. Water: Potable.
 - 5. Comply with the VDOT standards and specifications.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, backfilling, and identification materials and their installation are specified in Division 2 Section "Earthwork." Arrange for installing green warning tapes directly over piping and at outside edges of underground structures.
 - 1. Use warning tape or detectable warning tape over ferrous piping.
 - 2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.2 PIPING APPLICATIONS

A. Piping Applications: Include watertight, silttight, or soiltight joints

1. Install reinforced concrete pipe and fittings in accordance with VDOT standards and specifications.
2. Install smooth interior corrugated plastic pipe and fittings and PVC pipe and fittings in accordance with manufacturer's guideline for heavy duty drainage applications.

3.3 INSTALLATION, GENERAL

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.

C. Use curb inlets / catchbasins / storm manholes for changes in direction.

D. Install gravity-flow piping and connect to storm drains, of sizes and in locations indicated. Terminate piping as indicated.

1. Install piping pitched down in direction of flow, at slope indicated.

3.4 PIPE JOINT CONSTRUCTION AND INSTALLATION

A. Join and install pipe and fittings according to installations indicated.

3.5 CURB INLET / CATCH-BASIN / STORM MANHOLE INSTALLATION

A. Set frames and grates to elevations indicated.

3.6 CONCRETE PLACEMENT

A. Comply with VDOT standards and specifications..

3.7 DRAINAGE SYSTEM INSTALLATION

A. Install drains in locations indicated.

1. Set drain frames and covers with tops flush with pavement surface.
2. Use concrete that will attain minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
3. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

3.8 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 1. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 2. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 3. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems according to authorities having jurisdiction.

3.9 PROTECTION AND CLEANING

- A. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
- B. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.
 1. Place plug in end of incomplete piping at end of day and when work stops.
 2. Flush piping between curb inlets and other structures to remove collected debris, if necessary.

END OF SECTION 332630