

VIRGINIA HOSPITAL CENTER DEMOLITION PHASE 2 SPECIFICATIONS BID SET



RRMM #: 13356.28

Address: 611 S CARLIN SPRINGS ROAD, ARLINGTON, VA 22204

Date: June 22, 2022



Architect / Interior Design:	RRMM Architects
Civil Engineer:	A. Morton Thomas and Associates, Inc.
Structural Engineer:	Greenman-Pedersen, Inc.
M, E, P Engineers:	Greenman-Pedersen, Inc.

<u>SPEC #</u>	<u>SPEC TITLE</u>
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SECTION 011100 - SUMMARY OF WORK**PART 1 - GENERAL****1.1 DESCRIPTION**

- A. Furnish all labor, new materials, tools, equipment, supplies and services for all work as indicated, in accordance with provisions of the Contract Documents.
- B. Although such work is not specifically indicated, furnish and install all supplementary, miscellaneous, incidental items, tests and inspections, appurtenances and devices incidental to, or necessary for, a sound, secure and complete installation.
- C. The Work shall be complete, and all work, materials, and services not expressly called for in the Specifications which may be necessary for complete and proper construction to carry out the Contract in good faith, shall be performed, furnished, and installed by the Contractor at no additional cost to the Owner. Qualified, careful and experienced workers shall execute the Work in the best and most workmanlike manner.

1.2 SUMMARY OF WORK

- A. This project encompasses the complete demolition of the Virginia Hospital Center (VHC) facility. The VHC hospital complex is located at 601 S Carlin Springs Road and consists of a two-story, 163,000 sf building with associated parking lots, and above and below grade structures. The demolition scope includes the remediation of hazardous materials including asbestos-containing materials (ACM) and lead-based paints (LBPs). Project completion includes final site grading and plantings.
- B. The summary of Work described herein is an overall summary of the responsibilities of the Contractor and his relation to the Owner. It does not supersede the specific requirements of the Contract Documents.

1.3 WORK SITE INSPECTION

- A. The Contractor is responsible for examination of the work site and a thorough acquaintance with the details and requirements of the Contract Documents including obstacles likely to be encountered in the performance and completion of the Work. No allowance will be made, subsequent to completion of the bidding process, for any error or negligence, inadvertent or otherwise, on the part of the Contractor, for failure to comply with documented contract requirements.

1.4 PROJECT INFORMATION

- A. **Project Identification:** Virginia Hospital Center Demolition
- B. **Project Location:**
 - a. Hospital: 601 South Carlin Springs Road, Arlington, Virginia 22204
 - b. Doctor's Office Building: 611 South Carlin Springs Road, Arlington, Virginia 22204
- C. **Owner:**
Arlington County, Facilities Design & Construction
1400 N Uhle St.
Arlington, VA 22201
P: 703.228.4509
- D. **Architect:**
RRMM Architects, PC

2900 South Quincy Street, Suite 710
Arlington, VA 22206
P: 703.998.0101

- E. **Civil Engineer:**
AMT ENGINEERING
800 King Farm Blvd.
Rockville, MD, 20850
P: 301.881.2545

- F. **MEPS Engineers:**
GPI Engineering
8001 Braddock Road, Suite 200
Springfield, VA 22151
P: 703.978.0100

1.5 CONTRACTOR'S USE OF SITE

- A. Use of Site:
- a. Phase 1 - Restricted Use of Site: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as required for access to the area of Work.
 - b. Phase 2 - Unrestricted Use of Site: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. Condition of Existing Building: Maintain portions of existing buildings affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.6 COORDINATION WITH OCCUPANTS

- A. Occupancy: The existing adjacent Doctor's Office Building will be fully occupied for the duration of the Project. Cooperate with building occupants during construction operations to minimize conflicts and facilitate owner usage. Perform the Work so as not to interfere with day-to-day operations. Maintain existing exits and all life safety systems unless otherwise indicated.
- B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from owner and approval of authorities having jurisdiction.
- C. Notify owner not less than 72 hours in advance of activities that will affect owner's operations.

1.7 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
 - a. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between 7:00 a.m. to 7:00 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
- C. Existing Utility Interruptions: Do not interrupt utilities serving occupied facilities unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:
- D. Notify Owner not less than seven days in advance of proposed utility interruptions.
- E. Obtain Owner's written permission before proceeding with utility interruptions.

- F. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to occupied building with owner.
- G. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances on Project site is not permitted.
- H. Employee Screening: Comply with Owner's requirements for drug screening of Contractor personnel working on Project site.
- I. Contractor is responsible for examination of the work site and a thorough acquaintance with the details and requirements of the Contract Documents including obstacles likely to be encountered in the performance and completion of the Work. No allowance will be made, subsequent to completion of the bidding process, for any error or negligence, inadvertent or otherwise, on the part of the Contractor, for failure to comply with documented contract requirements.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 011100

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

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. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
 - 1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
 - 2. Section 013100 "Project Management and Coordination" for requirements for forms for contract modifications provided as part of web-based Project management software.

1.3 MINOR CHANGES IN THE WORK

- A. Project Officer will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Project Officer will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Project Officer are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times,

and activity relationship. Use available total float before requesting an extension of the Contract Time.

- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Project Officer.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 4. Include costs of labor and supervision directly attributable to the change.
 - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - 6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

1.5 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
- B. Unit-Price Adjustment: See Section 012200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Change Proposal Request, Project Officer will issue a Change Order for signatures of Owner and Contractor.

1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Project Officer may issue a Construction Change Directive. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.8 WORK CHANGE DIRECTIVE

- A. Construction Change Directive: Project Officer may issue a Construction Change Directive. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.
 - 1. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, List of Subcontracts, and Submittal Schedule.
- B. The Contractor's Construction Schedule and Submittal Schedule are included in Section "Submittals".

1.3 SCHEDULE OF VALUES

- A. The General Contractor shall coordinate preparation of its Schedule of Values for its part of the Work with preparation of the Contractors' Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
 - a. Contractor's construction schedule.
 - b. Application of Payment form.
 - c. List of subcontractors.
 - d. List of products.
 - e. List of principal's suppliers and fabricators.
 - f. Schedule of submittals.
 - 2. Submit the Schedule of Values to the Project Officer at the earliest feasible date, but in no case later than 7 days before the date scheduled for submittal of the initial Application for Payment.
- B. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for the Schedule of Values. Also include all items shown on the drawings but not included in a particular specification section.
 - 1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of the Architect.
 - c. Project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - 2. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed; provide a line item and schedule value for each

specification section at a minimum. Where the architect requests that a line item be broken down into further subcategories the contractor shall comply

- a. Generic name.
 - b. Related Specification Section.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that have affected value.
 - g. Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent.
3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.
 4. Round amounts off to the nearest whole dollar; the total shall equal the Contract sum.
 5. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 6. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.
 - a. At the Contractor's option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense.
 7. Schedule Updating: Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT:

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Construction Manager and paid for by the Owner.
 1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.
- B. Payment Application Times: Each progress payment date is as indicated in the Agreement. The period of construction Work covered by each Application or Payment is the period indicated in the Agreement.
- C. Payment Application Forms: Use AIA G-702 - Latest Edition.
- D. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Contractor.
 1. Entries shall match data on the Schedule of Values and Contractor's Construction

- Schedule. Use updated schedules if revisions have been made.
2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.
- E. Transmittal: Please submit five (5) completed copies of the AIA G-702, Schedule of Values and Certificate of Payment. These forms may be xeroxed but the signatures of the Contractor's representative must be original. Page 2 of the Schedule of Values should be complete and, if applicable, the original signatures of the architect/engineer should be obtained before the schedule is submitted to the Owner.
- F. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment (within 30 days of Notice to Proceed) include the following:
1. List of subcontractors.
 2. List of principal suppliers and fabricators.
 3. Schedule of Values.
 4. Contractor's Construction Schedule (90-day) detailed-Schematic of Balance.
 5. Schedule of principal products.
 6. Schedule of unit prices.
 7. Submittal Schedule. (preliminary, if not final).
 8. List of Contractor's staff assignments and their resumes
 9. List of Contractor's principal consultants.
 10. Copies of building permits.
 11. Copies of authorizations and licenses from governing authorities for performance of the Work.
 12. Initial progress report.
 13. Report of pre-construction meeting.
 14. Certificates of insurance and insurance policies.
 15. Performance and payment bonds.
 16. Data needed to acquire Owner's insurance.
 17. Initial settlement survey and damage report.
- H. Second Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the second Application for Payment (within 45 to 60 days of Notice to Proceed).
1. Detailed CPM Schedule for entire project.
- I. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portion of the Work.
- J. Administrative actions and submittals that shall proceed or coincide with this application include:
1. Occupancy permits and similar approvals.
 2. Warranties, guarantees, and maintenance agreements.
 3. Test/adjust/balance records.
 4. Maintenance instructions.
 5. Meter readings.
 6. Start-up performance reports.
 7. Change-over information related to Owner's occupancy, use, operation and

- maintenance.
 - 8. Final Cleaning.
 - 9. Application for reduction of retainage, and consent of surety.
 - 10. Advice on shifting insurance coverages.
 - 11. Final progress photographs.
 - 12. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.
- K. Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:
- 1. Completion of Project closeout requirements.
 - 2. Completion of items specified for completion after Substantial Completion.
 - 3. Assurance that unsettled claims will be settled.
 - 4. Assurance that Work not complete and accepted will be completed without undue delay.
 - 5. Transmittal of required Project construction records to Owner.
 - 6. Certified property survey.
 - 7. Proof that taxes, fees and similar obligations have been paid.
 - 8. Removal of temporary facilities and services.
 - 9. Removal of surplus materials, rubbish and similar elements.
 - 10. Change of door locks to Owner's access.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 012900

SECTION 013000 – SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including;
 - 1. Contractor's construction schedule
 - 2. Submittal schedule
 - 3. Project Submittals (Product Data, Shop Drawings, Samples, etc.)
 - 4. Daily Construction Reports
 - 5. Administrative Submittals: Refer to other Division-1 Section 010201 and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:
 - a. Permits.
 - b. Performance and Payment Bonds
 - c. Insurance Certificates
 - d. List of Subcontractors
- B. The Schedule of Values submittal is included in Section 012900 "Applications for Payment."

1.3 SUBMITTAL PROCEDURES

- A. Coordinate preparation and processing of submittals with the order of construction activities. Upload and transmit each submittal via e-mail sufficiently in advance of the performance of related construction activities to avoid construction delays. Timely submission of submittals shall be a condition for approval of all progress payments to the Contractor. All submittals required by Divisions 1-33 shall comply with the requirements of Division 1 including, but not limited to:
 - 1. Schedule of Values
 - 2. Project schedule and updates
 - 3. Major subcontractors and suppliers' milestones
 - 4. Submittal schedule
- B. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
- C. Coordinate submission of separate submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
- D. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- E. Processing:

1. Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for re-submittals
 2. Allow fifteen (15) working days, exclusive of transit time, for initial review. Allow additional time if processing must be delayed permitting coordination with subsequent submittals. The Architect will promptly advise the Contractor when a submittal being processed must be delayed for coordination.
 3. If subsequent submittals are necessary, process the same as the initial submittal.
 4. Allow three weeks for reprocessing each submittal
 5. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.
- F. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
1. Provide a space approximately 4" x 5" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
 2. See General Conditions for information on label.
- G. Submittal Transmittal:
1. Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Architect via e-mail using a transmittal form. Each submittal must have a separate transmittal form. Multiple submittals received on one transmittal form will be returned unreviewed. All submittals not in accordance with the requirements of this section will be immediately returned "Not Reviewed". Submittals received from sources other than the Contractor will be returned without action.
 2. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.
 3. Substitutions must be clearly identified on submittal.
- H. Submittal Timeline Requirements: The contractor shall transmit all submittals to the architect within ninety (90) calendar days after the issuance of the Notice to Proceed. The Owner shall have the right to withhold progress payments until all submittals are made.
- I. Electronic (CAD) Files
1. The Architect will make electronic (CAD) files of the drawings available to the contractor under the following conditions:
 - a. The contractor shall sign and abide by the architect's Graphic Files Agreement. A copy of the agreement will be provided to the contractor upon request.
 - b. The contractor shall pay the architect for the files as follows:
 1. The cost of preparing the CADD files for use by the Contractor requires that the Architect charge a nominal fee for their use. The following schedule is to be used to provide the Contractor with copies in one of two electronic formats:

1 to 10 drawings	\$200.00 set-up charge + \$25 per drawing
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- 10 to 100 drawings \$500.00 set-up charge + \$10 per drawing
- 101 to 500 drawings \$1,000.00 set-up charge + \$5 per drawing

- 2. The cost of converting the CADD files from .dwg (native AutoCAD) to .dxf for use with other drafting programs is as follows:
 - 1 to 500 drawings \$200.00 set-up charge + \$5 per drawing

- 3. The cost of providing electronic file media, based on estimated cost of the media, is as follows:
 - CD \$200.00 set-up charge + \$50 / CD

1.4 SUBMITTAL NAMING/NUMBERING CONVENTION

- A. The following submittal naming and numbering convention shall be followed for all Contractor submittals. Using Section 033000, "Cast-In-Place Concrete" as the example, the submittal number, 033000-01-01 would be defined as follows:

6-digit spec. section #	2-digit Sequential #	2-digit iteration
033000	01	01

- B. The first six-digit field refers to the specification section for the product, in this case, 'Concrete'. The second 2-digit field is to indicate the sequential submittal #. In this particular example, the submittal is for the first submittal of division 03300 to be transmitted. The final 2-digit iteration field is to identify successive reviews of the same submittal, i.e. 01 = first submittal, 02 = second, etc. Contractor submittals are to follow this naming convention for submittals called for by the individual Specification sections. The specification submittal types are defined in the following paragraphs.

1.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. See Section 013200 Construction Schedule for submittal requirements.

1.6 SUBMITTAL SCHEDULE

- A. A preliminary submittal schedule is to be submitted 15 days after the Notice of Award.

- B. After the acceptance of the Contractor's construction schedule, prepare a final submittal schedule to be submitted with the CPM 30 days after Notice to Proceed. The final schedule will be subject to review by the Architect.

- C. Distribution: Following response to initial submittal, print and distribute copies to the Architect, Owner and subcontractors.

1.7 DAILY CONSTRUCTION REPORTS

- A. Prepare a daily construction report, recording the following information concerning events at the site; Keep the daily construction reports in a binder in the project trailer and make available to the owner / architect when requested:
 - 1. List of subcontractors at the site.
 - 2. Approximate count of personnel at the site.
 - 3. High and low temperatures, general weather conditions.
 - 4. Accidents and unusual events.
 - 5. Meetings and significant decisions.

6. Stoppages, delays, shortages losses
7. Meter readings and similar recordings.
8. Emergency procedures.
9. Orders and requests of governing authorities.
10. Change orders received, implemented.
11. Services connected, disconnected.
12. Equipment or system tests and start-ups.
13. Partial completions, occupancies.
13. Substantial completions authorized.

1.8 SHOP DRAWINGS

- A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered to be a Shop Drawing.
- B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
 1. Dimensions.
 2. Identification of products and materials included.
 3. Compliance with specified standards. Notation of dimensions established by field measurement.
- C. Submittal:
 1. Submit one PDF file for the architect's review. If the PDF is illegible, the entire submittal will be returned unchecked. The re-submittal will have the same review time as the contractor's original submittal. Once the architect has reviewed the submittal and all corrective actions have been made by the contractor the contractor shall submit 2 printed copies of the submittal to Arlington County for their records.
 2. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

1.9 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."
- B. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information.
 1. Manufacturer's printed recommendations.
 2. Compliance with recognized trade association standards.
 3. Application of testing agency labels and seals.
 4. Notation of dimensions verified by field measurement.

- C. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
- D. Environmental Requirement Verification: Submit verification (i.e. manufacturer's letter of certification, highlighted product information, independent test reports, etc...) as required by each specification section.
- E. Material Safety and Data Sheets
 - 1. Provide MSDS (Material Safety and Data Sheets) for all products submitted and used on the project.
 - 2. Provide and highlight VOC information on all MSDS sheets and identify compliance with requirements.

1.10 SUBMITTALS:

- A. Submit as required by 1.8.C above.
- B. Distribution: Furnish copies of final submittal to installers, subcontractors, and suppliers required for performance of construction activities. Show distribution on transmittal forms.
- C. Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession.
- D. Do not permit use of unmarked copies of Product Data in connection with construction.

1.11 ARCHITECT'S ACTION

- A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Architect will review each submittal, mark to indicate action taken, and return promptly.
- B. Compliance with specified characteristics is the Contractor's responsibility.
- C. Action Stamp: The Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:
 - 1. Where submittals are marked "Reviewed," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
 - 2. When submittals are marked "Furnish as Corrected, " that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
 - 3. When submittal is marked "Revise and Resubmit" or "Rejected," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
- 3. Do not permit submittals marked "Rejected, Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.

4. Re-submittals: All re-submittals shall have the same review times as the contractor's initial submittal.

1.12 SUBMITTAL REQUIREMENTS FOR COMMISSIONING

A. Data for Commissioning.

1. The Contractor will receive a written request from the Commissioning Authority requesting specific information needed about each piece of commissioned equipment or system.
2. Typically, this will include detailed manufacturer installation and start-up, operating, troubleshooting, and maintenance procedures, full details of any owner-contracted tests, fan and pump curves, full factory testing reports, if any, and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Commissioning Authority.
3. The Commissioning Authority may request further documentation necessary for the commissioning process.
4. This data request may be made prior to normal submittals.
5. Much of this information is contained in the regular O&M manual submittals normally submitted in the project. Typically, this information is required prior to the regular formal O&M manual submittals.

- B. Contractor's responsibility for deviations in submittals from the requirements of the contract Documents is not relieved by the Commissioning Authority's review.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 013000

SECTION 013100 - PROJECT MEETINGS**PART 1 - GENERAL**

1.1 Furnish all labor, materials, and services for all required meetings in accordance with contract provisions.

1.2 RELATED REQUIREMENTS

- A. Project Coordination
- B. Scheduling
- C. Construction Quality Control Meetings
- D. Safety Meetings
- E. Project Closeout

PART 2 - PRODUCTS (NOT USED)**PART 3 EXECUTION****3.1 PRE-CONSTRUCTION MEETING**

- A. The Pre-Construction Meeting is to be scheduled by the Owner within fifteen (15) days after the Notice of Award and prior to the start of construction. The conference will be held at a location/time to be determined by the Owner. Minutes of the meeting will be prepared by the Owner/Architect and shall become a part of the Contract file.
- B. Attendance:
 - 1. Owner
 - 2. Architect (and consultants)
 - 3. General Contractor
 - 4. Major Subcontractors
 - 5. Utility Company and VDOT representatives (as applicable)
 - 6. General Contractor's representatives for Safety, Quality, and LEED
- C. Agenda:
 - 1. Allow each attendee to present their role in the project and any special requirements they may have.
 - 2. Discuss Traffic Control and procedures for open cut and road closures, if applicable, with VDOT representative.
 - 3. Discuss Contractor's safety plan, quality control, housekeeping, temporary facilities, jobsite security, and emergency procedures.
 - 4. Discuss the status and schedule of all utility relocations or new services and ensure that the utility companies have been authorized to provide the relocation or new services.
 - 5. Establish contract protocols regarding communications, submittals, RFIs, Payment Application, Schedule, testing, inspections, etc.
 - 6. Transmit contract required construction sets of drawings, specifications and permits to the Contractor.
 - 7. Review the status of Labor and Material Bonds, Performance Bond, Insurance Certificates, List of proposed subcontractors, and other relevant information needed from the Contractor.
 - 8. Disseminate the Notice to Proceed (NTP) date.
 - 9. Obtain Emergency Contact information for the Contractor and other parties as required.

3.2 PROGRESS MEETINGS

A. Project progress meetings will be held once every two weeks or at a frequency directed by the Owner. Meeting location prior to mobilization to the site will be at Owner discretion but meetings will be held at the project site once the site office trailers are established. The Owner/Architect will prepare the agenda, chair the meeting, and prepare meeting minutes.

B. Meeting Attendance:

1. County Project Engineer
2. County Site/Building QC Inspectors
3. Project Manager (County Design Agency)
4. A/E Project Manager and consultants as required for a particular meeting
5. Contractor Project Manager
6. Contractor Superintendent
7. Contractor Safety and QC Engineers
8. User Agency Representatives/Coordinator

C. Meeting Agenda:

1. Review and approve minutes of previous meeting.
2. Review Construction Schedules, review work progress since last meeting, review planned progress during next work period.
3. Review Old Business from previous meetings.
4. Document any field observations, questions and decisions.
5. Review regulatory inspection status.
6. Review Deficiency Log.
7. Review ADA compliance.
8. Review Submittal Log and identify key submittals that require action.
9. Review status of RFIs / ASIs and identify those key RFIs / ASIs that require action.
10. Review status of Change Orders, PCO's, and Pending PCO's or Construction Change Directives, RFPs, and FOs.
11. Review Pay Application Status.
12. Review Contractor Safety Plan and discuss any observed concerns.
13. Review Q/C or Quality Management Plan and discuss any concerns.
14. Discuss New Business.

3.3 PRE-INSTALLATION or PRE-DEMOLITION CONFERENCES

A. Conduct conferences at the Project site before the start of each construction activity as specified in the Specifications or otherwise directed by the Owner.

B. Attendees: Subcontractors, installers and representatives of manufacturers involved with or affected by the installations shall attend the meeting. The Contractor shall advise the Owner/Architect of scheduled meeting dates.

C. Agenda: Review progress of construction activities and preparations for the particular activity, including requirements for the following:

1. The applicable contract document requirements.
2. Related RFIs / Change Orders
3. Purchases / Deliveries

4. Submittals / Review of mockups
 5. Possible conflicts (space, access, compatibility issues)
 6. Time schedules
 7. Temporary facilities and controls
 8. Inspections/Quality control
 9. Safety (Protection of construction, equipment, and personnel)
 10. Installation procedure(s)
 11. Coordination with other work
- D. The Contractor is to keep a written record of each meeting and produce/distribute minutes recording discussions and agreements for items above to all attendees.
- E. Do not proceed with installation if the conference has not been successfully concluded.
- F. ADA Compliance: Compliance with ADA requirements shall be discussed at the preconstruction meetings for the following activities:
1. Framing rough-in
 2. Masonry construction
 3. Plumbing rough-in
 4. Electrical rough-in
 5. Casework/millwork installation
 6. Exterior sidewalk and paving installation

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION SCHEDULE**PART 1 - GENERAL****1.1 GENERAL SCHEDULING REQUIREMENTS**

- A. Pursuant to Article 4.11 of the General Conditions of this Contract, the following additional scheduling requirements are a part of this Contract.
- B. Work under this section shall consist of furnishing and maintaining a Construction Schedule utilizing a computer based network analysis scheduling program such as Primavera Project Planner (P6) or equal. The schedule shall be prepared in a precedence format and show in detail how the Contractor plans to execute and coordinate the Work. The Construction Schedule shall be based on and incorporate the Contract Milestone(s) and Completion Dates specified and shall show the order in which the Contractor shall perform the Work. In addition, the Construction Schedule shall indicate the planned dates of submittal preparation and review, start-up and testing for equipment, systems and subsystems; and all interface activities and matters involving mutual support between the Contractor, Subcontractors, Suppliers, Code Enforcement Inspections, and the Owner. The Contractor shall use this schedule in the planning, scheduling, direction, coordination and execution of the Work.

C. Reporting Format

The Contractor's scheduling software shall have the capability of furnishing data reports or sorts in the following formats:

1. Activity listing by activity;
2. Activity listing by early and late start dates;
3. Activity listing by early and late finish dates;
4. Critical path activities;
5. Activity listing by responsibility code, Subcontractor, or division;
6. Activity listing by total float;
7. Computer produced time scaled network diagram; and
8. Computer produced bar chart.

PART 2 - PRODUCTS (NOT USED)**PART 3 - EXECUTION****3.1 GENERAL**

- A. The Construction Schedule shall be cost loaded and used as the basis for determining the Schedule of Values, Payment Schedule, and Progress Payments. The Owner shall be under no contractual obligation and shall have no responsibility to process Contractor's application for payment until the Contractor has submitted an acceptable Construction Schedule in accordance with the requirements of the Contract Documents.
- B. The Contractor agrees to adjust network logic, activity sequences or inactivity durations subject to the A/E review and approval, including, but not limited to, adjustments as required to maintain progress to ensure completion within the Contract Time, and to absorb within his schedule slippages, delays, changes in sequence required by project conditions, labor inefficiency and resource unavailability subject only to any time extension justified under the Contract Documents.

- C. The Contractor shall provide written documentation signed by all major Subcontractors and suppliers of the major equipment that demonstrates they concur with the elements of the Construction Schedule and will perform in accordance with it. The written documentation must be submitted with the schedule or immediately following execution of a contract with the Subcontractor and supplier of major equipment. Any modifications to the schedule which impacts major Subcontractors and equipment suppliers must also be accompanied by written documentation signed by the major Subcontractors and equipment suppliers which demonstrates that they concur with the updated schedule and will perform in accordance with it.
- D. Float or slack is defined as the amount of time between the early start date and the late start date or the early finish date and the late finish date of any of the activities in the Construction Schedule. Float or slack is not time for the exclusive use or benefit of either the Owner or the Contractor. Use of float suppression techniques such as preferential sequencing or logic, special lead/lag logic restraints, unspecified milestones, and extended activity times are prohibited and use of float time disclosed or implied by use of alternative float-suppression techniques shall be shared to the benefit of Owner and Contractor. Use of such float suppression techniques shall be cause for rejection of the schedule and any revisions or updates.
- E. The schedule shall clearly identify the critical path activities leading to the Substantial Completion and Final Completion dates as set forth in the Contract Documents. If the schedule indicates an earlier completion date than that set forth in the Contract Documents, the difference between the Schedules and the Contract Document dates shall be considered to be part of the total float available. This float is a resource available to both the Owner and the Contractor and may not be used as a basis of claim by the Contractor for additional compensation for actual project completion after the early completion schedule date but before the Substantial Completion or Final Completion dates.
- F. The schedule as developed shall show the sequence and interdependence of activities required for complete performance of the work. The Contractor shall be responsible for ensuring all work sequences are logical and the schedule shows a coordinated plan of the work.
- G. Failure by the Contractor to include any element of work required for performance of the Contract or failure to properly sequence the work shall not excuse the Contractor from completing all work within the Contract Time.
- H. The work shall be executed at such a rate as will ensure meeting the specified Substantial Completion date in the Contract. By execution of the Contract, the Contractor represents it has analyzed the work, the materials and methods involved, the systems of the building, availability of qualified labor, restrictions of the site, constraints imposed, workload and capacity to perform the work, and agrees that the specified times are reasonable considering the existing conditions prevailing in the locality of the work, including weather conditions, and other factors, with reasonable allowance for variations from average or ideal conditions.
- I. The Substantial Completion date provided is considered essential to the satisfactory performance of the Contract and to the coordination of all work on the project. The Owner reserves the right to require the Contractor to execute the work in accordance with the specified Substantial Completion dates.
- J. The Contractor is to provide the operations, manpower, resources, materials, and all items and work necessary to complete the work and meet the Substantial Completion and Final Completion dates provided. The Contractor understands and agrees that: the Substantial Completion, Final Completion, actual start and completion dates, rate of progress, and coordination are essential conditions of this project. The Contractor must include in this schedule any contractual special conditions including, but not limited to, phased work, work restrictions/access/shift work, and work being performed by separate

Contractors. The Contractor is prohibited from assigning milestones that are not consistent with key dates shown in the Contract Documents.

- K. It is understood and agreed that TIME IS OF THE ESSENCE and the Contractor agrees to diligently follow and adhere to the schedule with due diligence so as to execute the work within the Substantial Completion and Final Completion dates stipulated in the Contract Documents. The Contractor shall, at no additional cost, take all necessary steps, including overtime, double shifts, weekends, and holiday work to complete this work and meet the Substantial Completion and Final Completion dates stipulated in the Contract Documents.

3.2 PRELIMINARY CONSTRUCTION SCHEDULE

- A. The Contractor shall submit a Preliminary Construction Schedule within 15 calendar days after the Notice of Award.
- B. The Preliminary Construction Schedule is required before the start of construction activities and shall consist of four (4) prints of a Network Diagram and two (2) sets of the program data files on an electronic exchange media such as a compact disk. The Contractor's Submittal shall indicate which days of the week will be planned work days and the dates of all scheduled non-work days.
- C. The Preliminary Construction Schedule shall depict major components of the Work and the sequence relations between major components and subdivisions of major components with further detail/attention to construction and procurement activities to be performed or which are being performed during the first 90 days of the project.
- D. The Preliminary schedule shall include those activities that are necessary to properly indicate:
 - 1. The approach to the overall Work. The Work for each phase or area must be represented by a least one Summary Activity, such that the activities cumulatively indicate the entire Construction Schedule.
 - 2. Summary Activities shall be replaced and expanded with detailed activities when the Preliminary Schedule is incorporated into the Construction Schedule.
- E. The schedule shall be computerized and presented in the form of bar charts and shall consist of horizontal lines, or bars plotted along a daily time scale. The horizontal bars shall indicate the start and finish dates for each work activity depicted.
- F. The Preliminary Construction Schedule will be superseded upon approval of the Construction Schedule described below.
- G. The Owner, A/E, and Contractor shall meet within ten (10) days of receipt of the Contractor's proposed Preliminary Schedule for a joint review and any correction or adjustment of the proposed Interim Schedules. Acceptance by the Owner of the Contractor's Preliminary Schedule creates neither a warranty, expressed or implied, nor acknowledgement of admission of the reasonableness of the activities, logic, durations, manpower or cost loading the Interim Schedule.

3.3 CONSTRUCTION SCHEDULE

- A. The Contractor shall submit a detailed Construction Schedule within 30 calendar days of the Notice to Proceed. If the Construction Schedule is not submitted in a complete and acceptable manner by the next payment application the Owner shall be under no contractual obligation and shall have no responsibility

to process Contractor's application for payment until the Contractor has submitted an acceptable schedule in accordance with the requirements of the Contract Documents.

- B. The Construction Schedule shall consist of two parts: a computer-drawn time-scaled network diagram and a computer-generated network analysis or printout. The submission shall include four (4) prints of the Network Diagram, four (4) sets of computer produced Schedules and Reports, and two (2) sets of the program data files on an electronic exchange media such as a compact disc. The Construction Schedule shall cover the entire Contract Time and include all revisions reviewed and accepted by the Owner. Each major component and subdivision component shall be accurately plotted on time scale sheets on reproducible paper not to exceed 30 inches by 42 inches in size.
- C. The initial Construction Schedule submittal shall reflect the Contractor's plan for the performance of all of the Work as of the date of the Notice to Proceed and shall not reflect the actual progress of any of the Work. The Contractor's Construction Schedule shall consist of but not be limited to the following:
 - 1. Procurement Activities, including preparation and review of submittals, ordering, manufacturing, fabrication, and delivery of long-lead equipment or materials, and any required off-site testing by the Owner or A/E. Long-lead items include equipment or materials requiring more than one month between ordering and delivery to the job site.
 - 2. Construction Activities, including A/E review of samples, mock-ups, curing, code enforcement inspections, and required testing and/or commissioning.
 - 3. The Construction Schedule shall indicate the sequence of the Work and the time of starting and completing each activity.
- D. All restraints and contract milestones shall be clearly indicated in the Construction Schedule. The Construction Schedule shall be used as the basis for reporting progress, schedule controlling and schedule forecasting, as required herein, and shall be sufficiently detailed so as to allow the Owner to evaluate the Contractor's planned schedule and to monitor Contractor's Progress on a day-to-day basis during performance.
- E. The Construction Schedule as approved shall be the Baseline Schedule against which all progress shall be measured. It shall be used by the Contractor and the A/E as the basis for evaluating changes and claims and, in conjunction with the schedule of values, for evaluation of the Application for Payment. The Schedule of Values (Article 9.2 of the General Conditions) and the Payment Schedule (Article 9.6.3 of the General Conditions) shall be developed using the values indicated in the Construction Schedule as a guideline.
- F. Should A/E or Owner reject Contractor's Construction Schedule, or any subsequent update or revision, as not being in accordance with the Contract Documents, Contractor shall, within fourteen (14) calendar days of receipt of the A/E's rejection, make the changes or revisions required to conform to the Contract Documents, or as directed by Owner should A/E and Contractor not agree to the revisions required.
- G. Activity Depiction
 - 1. Activity numbers shall be unique and shall not change as revisions are made to the schedule.
 - 2. Activity shall have a concise description of the Work represented by the activity. The Work related to each activity shall be limited to one work trade and one construction area.
 - 3. Activities shall be cost loaded to show its dollar value as a part of the whole.
 - 4. The durations of activities shall be expressed in whole working days, with no single activity in excess of fourteen (14) calendar days or a value exceeding \$25,000 without prior acceptance of the A/E or Owner. Non-construction activities such as concrete curing, mobilization, shop drawings and sample

- submittals, fabrication of materials, and delivery of materials and equipment, may have values in excess of fourteen (14) calendar days and values over \$25,000 unless otherwise directed by the A/E.
5. Activities shall be assigned separate activity codes to create a Work breakdown structure and, as a minimum, shall include:
- a. An activity code (maximum five characters) to define specific performance responsibility by discipline or Subcontractor as acceptable to the A/E. All abbreviations shall be fully described in a legend attached to the Construction Schedule.
 - b. An activity code (maximum five characters) to define concise Work area (e.g. floor or elevation, location of yard piping, location of site electrical, paving locations). All abbreviations shall be fully described in legend attached to the Construction Schedule. As requested by the Owner or A/E, either prior or subsequent to the acceptance of the Construction Schedule, the Contractor shall provide, without additional cost to the Owner, on prints of the Contract Drawings graphic illustrations of the relationships of construction activities to intended Work areas as identified by the Contractor.
 - c. An activity code (maximum five characters) to identify the project phase of each activity as it relates to the phases identified in these documents.
 - d. An activity code (maximum five characters) to identify the Structure or building as defined on the contract drawings.
 - e. An activity code (maximum five characters) to identify the Specification for the activity.
- H. The Construction Schedule shall indicate that the project will begin on the date given in the Notice to Proceed and will be completed within the number of calendar days specified in the Contract Documents.
- I. The Contractor shall ensure that the schedule represents an accurate, efficient, reasonable and feasible plan and method for accomplishing the Work throughout the time of performance. While the owner and A/E will review the Construction Schedule, the schedule itself is the Contractors' who has full responsibility for its preparation, content, revisions and updating in accordance with the requirements of the Contract Documents.
- J. It is to be expressly understood and agreed by the Contractor that the Owner does not guarantee that Contractor can start work activities on the "early start" or "late start" date or complete work activities on the "early finish" or "late finish" date shown in the baseline schedule, or any subsequent updates or revisions. If Contractor's schedule indicates that Owner or a separate Contractor is to perform an activity by a specific date, or within a certain duration, Owner or any separate Contractor under contract with Owner shall not be bound to said date or duration unless Owner expressly and specifically agrees in writing to same; the Owner's or A/E's overall review and approval or acceptance of the schedule does not constitute any agreement to specific dates or durations for activities or the Owner of any separate Contractor.
- K. The construction schedule shall indicate the following:
1. Procurement activities such as submittals and fabrication for critical materials and equipment.
 2. Off-site activities.
 3. Inspections, start up, testing and balancing, mobilization, and demobilization.
 4. Interfaces with the work of outside Contractors such as utility companies.
 5. Description of activity and activity number.
 6. Planned and remaining duration time for each activity.
 7. Early start date for each activity.
 8. Late start date for each activity.
 9. Early finish date for each activity.
 10. Late finish date for each activity.
 11. Float available for each path of activities containing float.

12. Actual start date for each activity begun.
 13. Actual finish date for each activity completed.
 14. Identification of all critical path activities in the network analysis.
 15. The critical path for the project, with said path of activities being clearly and easily recognizable on the time-scaled network diagram. The relationship between all non-critical activities and activities on the critical path shall be clearly shown on the network diagram.
 16. The percent complete of each activity in progress or completed.
- L. The Contractor shall submit a narrative report with the Construction Schedule indicating anticipated allocation of the following resources and work shifts to be utilized on the project:
1. Labor resources;
 2. Equipment resources;
 3. Whether work will be performed on a shift basis and whether it is to be done on a 5-, 6- or 7-day work week.
- M. Monthly anticipated adverse weather days as established in General Conditions, Article 8.6, TIME EXTENSIONS FOR WEATHER, shall be considered and included in the planning and scheduling of all-weather affected Work activities in order to complete all Work within the Contract Time.
- N. Custom calendars should be developed by the Contractor to identify the differing holiday, weather, workweek, and other work calendars on which specific work activities will be performed. Each activity should be assigned to the calendar corresponding with its work activity, weather, or season.
- O. The Owner, A/E, and the Contractor shall meet, within 20 days of receipt by the Owner of the Contractor's proposed Construction Schedule, to perform a joint review of, and make corrections or adjustments to the proposed Construction Schedule. If the A/E or Owner questions the Contractor's proposed activities, logic, or durations, the Contractor shall, within seven (7) days of receipt of any A/E or Owner request, provide a satisfactory revision to or adequate justification for such to the A/E and Owner. The A/E or Owner may at any time as part of its review, acceptance and subsequent monthly updating process, request that additional details be included in the Construction Schedule. The Contractor shall, at no additional cost, provide the details requested to the satisfaction of A/E and Owner. In the event the Contractor fails to define any element of work, activity or logic, such omission or error, when discovered, shall be corrected by the Contractor in the next monthly Construction Schedule Update without effect on the Contract Time. Within fourteen (14) days after the joint review between the Contractor, A/E, and Owner, the Contractor shall revise the Construction Schedule in accordance with agreements reached or direction given during the joint review and submit diagrams, printouts and electronic copies as already specified. Acceptance by the Owner of the Contractor's Construction Schedule does not relieve the Contractor of any of his responsibility whatsoever for the accuracy or feasibility of the Construction Schedule, or of the Contractor's ability to meet Substantial Completion and Final Completion requirements of the Contract, and such acceptance also creates neither a warranty, expressed or implied, nor an acknowledgement or admission of the practicability of the Contractor's Construction Schedule.

3.4 NETWORK DIAGRAM REQUIREMENTS

- A. The Network Diagram shall be computer generated, in a time scaled format, on sheets no larger than 30" X 42" and no smaller than 11" x 17", printed in color, and with font sizes no smaller than 8 point.
- B. The Network Diagram shall be organized by grouping activities related to specific phases or areas of the Project together for ease of understanding and simplification.

C. The following shall be depicted on the Network Diagram for each activity:

1. Activity number
2. Description of Work
3. Activity duration
4. Designation of critical path where applicable.

3.5 COMPUTER PRODUCED SCHEDULE REPORT REQUIREMENTS

A. Schedule reports shall include, for each activity depicted in the Construction Schedule, the following information:

1. Activity Number
2. Description of the Work
3. Original Duration
4. Remaining Duration
5. Percent complete (time)
6. Work phase / area / floor codes as applicable
7. Responsibility code
8. Early Start and Finish dates
9. Actual Start and Finish dates
10. Total Float

B. The Contractor shall submit a Schedule Calculation Summary Report which includes listings of constraints, open-ends, out-of-sequence work, and scheduling statistics. This report is computer-generated when the Project Schedule is calculated after updating activity progress at the month end processing.

3.6 UPDATES

A. The Construction Schedule shall be updated every month to reflect the actual as-built data and the update shall be utilized as an essential part of the payment application review. Three (3) print copies and two (2) sets of the program data files on an electronic exchange media, such as a compact disc, of the monthly Construction Schedule update are to be submitted with the submission of each monthly Application for Payment with proposed updates and revisions marked thereon. If the Construction Schedule updates and revisions are not submitted in a complete and acceptable manner by the next subsequent payment application, then the Owner shall be under no contractual obligation and shall have no responsibility to process Contractor's application for payment until the Contractor has submitted an acceptable schedule update in accordance with the requirements of the Contract Documents. The updated construction schedule shall indicate the following:

1. Those activities in progress or to be performed in the future, and the percentage complete of each activity;
2. The critical path for the project based upon the latest update data;
3. Tabular reports sorted as follows: 1) by Activity ID, and 2) by Total Float by Early Start.
4. All activities affected by approved time extensions, including but not limited to revised Contract Completion dates and milestones.

B. Progress Reports

The Contractor shall forward to the Owner and A/E with each application for payment a narrative monthly summary report, in a form acceptable to the Owner and A/E of the progress of the Work including but not limited to the following information:

1. The progress of the Contract Work, whether in the mills, shops, or in the field, stating the existing status, rate of progress, estimated time of completion and cause of delays, if any.
 2. Description of work accomplished since submission of previous progress schedule and work planned during the next period.
 3. Comparison of the actual status of the Work with Contractor's Construction Schedule as previously submitted to the A/E or as previously updated or revised in accordance with the review of the Owner.
 4. Status of equipment and materials deliveries and shop drawing preparation and review.
 5. Changes or additions to Contractor's supervisory personnel since the preceding progress report.
 6. Causes of any delays.
 7. Changes in logic, sequence, or durations or activities and the reasons, therefore.
 8. Actions proposed by Contractor to restore schedule (including what is being done, or is planned to be done, in problem areas).
 9. What problems or changes are anticipated or expected by Contractor and what is Contractor's plan to deal with same so as to minimize or prevent any delay to completion.
 10. Changes in the Payment Schedule.
- C. Neither the updating or revision of Contractor's Construction Schedule nor the submission, updating, change or revision of any report or schedule submitted to A/E by Contractor under the Contract nor Owner's review or non-objection of any such report or schedule shall have the effect of amending or modifying, in any way, the Contract Time, any Contract Completion Date, or Contract Milestone Dates or of modifying or limiting in any way Contractor's obligations under this Contract.

3.7 REVISIONS

- A. If, as a result of the monthly construction schedule update, it is the opinion of the A/E and Owner that the Construction Schedule no longer represents the actual planned prosecution and the actual progress of the Work, the A/E or Owner may request that the Contractor revise the Construction Schedule to reflect its current planning. The Contractor shall submit to the A/E and Owner in writing, a schedule analysis illustrating the influence, if any, of the proposed schedule revision on Contract Time. Each such schedule analysis shall be submitted to the satisfaction of the A/E and Owner prior to the next Construction Schedule Update. Compliance with such submittal requirements shall be a condition precedent to any obligation of the Owner to consider any Application for Payment.
- B. If the schedule update indicates that the Substantial Completion date will be later than that required by the Contract the Contractor shall be required to prepare a Schedule Recovery Plan for regaining the time that the Project is behind schedule. The Schedule Recovery Plan shall be submitted within five (5) working days and should indicate in both narrative form and in a detailed time-scaled bar chart schedule with logic the following information:
1. Amount of time the activity is late.
 2. Reason for lateness
 3. Proposed method for recovering the time and achieving any/all required project Substantial Completion deadline(s).
- C. The Contractor may also request reasonable revisions to the Construction Schedule in the event that its planning for the Work is revised. If the Contractor desires to make changes in the Schedule to reflect revisions in its planned methods of operating and scheduling of the Work, the Contractor shall notify the

A/E and Owner in writing, stating the reason for the proposed revisions and submit to the A/E and Owner a schedule analysis illustrating the influence, if any, of the proposed schedule revision on Contract Time. Each such schedule analysis shall demonstrate how the Contractor would incorporate the proposed schedule revision into the Construction Schedule. The schedule analysis shall demonstrate the time impact of the proposed schedule revision to be initiated, reflecting the projected status of the Work at that point in time, and provide the event time computations of all affected activities if the proposed revisions were to be accepted by the A/E and Owner. Accepted revisions will be incorporated into the Construction Schedule at the next monthly Construction Schedule Update Meeting.

3.8 REQUESTED TIME ADJUSTMENT SCHEDULE

- A. If Contractor believes he is entitled to an extension of the Contract Time under the Contract documents, Contractor shall submit to A/E and Owner as a Proposed Change Order (PCO), a separate schedule analysis (entitled "Requested Time Adjustment Schedule") indicating suggested adjustments in the Contract Time which should, in the opinion of the Contractor, be made in accordance with the Contract Documents due to changes, delays, or conditions which are expected or contemplated by Contractor (whether such conditions are excusable under the Contract or are due to Contractor fault). This separate schedule shall be time-scaled utilizing a computer generated and computer-drawn network analysis schedule and shall be accompanied by a formal time extension request as required by the Contract Documents and a detailed narrative justifying the time extension requested.
- B. Time extensions for weather delays during a given month will be allowed only for actual work days in excess of those numbers provided by General Conditions Article 8.6, TIME EXTENSIONS FOR WEATHER, and only when those excess days of delay affect the current critical path(s) leading to the specified Substantial Completion or Contract Completion dates.
- C. The time adjustment request shall include schedule forecasts that predict the proposed Project Completion Date and a forecast of the achievement of milestones listed in the Owner-Contractor Agreement.
- D. The "Requested Time Adjustment Schedule" shall clearly and accurately reflect Contractor's actual intention and proposed time adjustments as of the latest update. It shall also reflect any adjustments made by Contractor in the logic, sequence or duration of any activities in the Construction Schedule, and any time extensions previously granted by Owner, along with actual and expected progress.
- E. Owner shall not have any obligation to consider any time extension request unless the requirements of the Contract Documents, and specifically, but not limited to these requirements, are complied with; and Owner shall not be responsible or liable to Contractor for any constructive acceleration due to failure of Owner to grant time extensions under the Contract Documents should Contractor fail to substantially comply with the submission requirements and the justification requirements of this Contract for time extension requests. Contractor's failure to perform in accordance with the Construction Schedule shall not be excused, nor be chargeable to Owner, because Contractor has submitted time extension requests.
- F. Extensions of time for performance as described in the Contract Documents will be granted only to the extent that time adjustments for the activity or activities affected exceed the total float along the path of activities affected at the time of Notice to Proceed of a change order or the commencement of any delay or condition for which an adjustment is warranted under the Contract Documents.
- G. Change Orders: If an extension or contraction of any milestone or completion date is authorized by a change order issued by the A/E and Owner the Contractor shall revise his Construction Schedule, milestone, and completion dates accordingly. Any and all activities impacted by a change to the milestone or completion date shall likewise be adjusted to reflect the revised requirements.

- H. All of the Contractor's detailed calculations, documents and Subcontractor data supporting or providing the basis for any schedules, reports and forecasts shall be made available within seven (7) days of A/E's request.

3.9 TWO-WEEK LOOK AHEAD SCHEDULE

- A. The Contractor shall prepare and distribute a two-week "look ahead" bar chart schedule at each progress meeting. The look ahead shall be in a format acceptable to the A/E and represent the Contractor's and Subcontractors' work plans for construction activities to occur during the following two (2) week period. The bar chart shall reference the specific activities as defined in the Construction Schedule and shall indicate locations of Work, quantities of materials to be installed and planned durations of activities.

END OF SECTION 013200

SECTION 013233 - PROJECT REPORTING AND PHOTOGRAPHS**PART 1 - GENERAL**

- 1.1** The Contractor, as a minimum, shall submit daily field reports, monthly progress reports, and project photographs to the Owner and AE for review, status and record purposes as indicated below.

PART 2 - PRODUCTS (NOT USED)**PART 3 – EXECUTION****3.1 PRE-CONSTRUCTION PHOTOGRAPHS**

- A. The Contractor shall be responsible for the production of pre-construction photographs prior to start on any work on-site. Pre-construction photographs shall document the condition of all existing surface features and structures within the project limits. The Contractor shall provide pre-construction photographs via CD in these areas prior to commencement of work.
- B. The Contractor is to identify all photographs with project name, Contractor's name, Project Number, Contract Number, date taken, and view/vantage point.

3.2 DAILY FIELD REPORTS

- A. The Contractor shall submit, in a format acceptable to the Owner, a Daily Field Report for all Contractor and Subcontractor activities for each day of the Contract from NTP to Substantial Completion. Each report shall be received by the Owner and AE no later than three calendar days after the date to which the report pertains. Each report shall contain the following data:
1. Project Name, Project Number, and Contract Number.
 2. The number of workers (by trade and company) and the hours worked by each worker.
 3. Work being performed, referenced to work location and associated CPM activity number(s).
 4. Weather
 5. Situations or circumstances which could delay work or give cause for claims for extension of time or added cost.
 6. Name and affiliation of all visitors to the site. Record their observations and/or reason for the site visit.
 7. Equipment utilized or on site and idle. Provide the serial numbers or other identifying features and hours worked for each piece of equipment utilized on that day.
 8. Report on any recordable or reportable safety issues.
 9. Report on any quality issues discovered or corrected.
- B. Non-Compliance - Failure to complete and submit the required reports may have an impact on approval of the Contractor's monthly payment application.

3.3 MONTHLY PROGRESS REPORTS

- A. The requirement for a formal monthly progress report will be satisfied by submission of required monthly progress photographs, the Contractor's Quality Control Plan with monthly updates (per specification 014000), schedule updates (per specification 013200) and a completed Contractor's Application for Payment. Should circumstances arise where the Owner feels that such documentation is not sufficiently addressing all issues taking place in the prosecution of the work, the Owner, at his discretion may direct the Contractor to provide additional information, photographs and/or narrative.

3.4 PROGRESS PHOTOGRAPHS

- A. Progress photographs shall be furnished by the Contractor in digital format, acceptable to the Owner, with sufficient pixilation to allow enlargement without noticeable loss of resolution.
- B. Depending on the size of the project and at the discretion of the Owner/Architect, a minimum of twelve (12) to a maximum of twenty-five (25) progress photographs shall be taken each month and shall be submitted with each Application for Payment (i.e. on or about the first day of each month) until project Substantial Completion.
- C. Photographs shall be taken from the same interior and exterior vantage points as directed by the Owner/Architect. Photos shall not be edited, modified, or enhanced in any way without the Owner's advanced approval in writing.
- D. The Contractor shall transmit these photographs via CD (one for Owner and one for Architect) with each month's Application for Payment. The Contractor is to identify all photographs with project name, Contractor's name, Project Number, Contract Number, date taken, and view or vantage point.

3.5 OTHER REPORTS

- A. As required and/or as specified in various Division 1, Technical Specifications, or Owner direction.

END OF SECTION 013233

SECTION 013523 - SAFETY AND SECURITY**PART 1 - GENERAL****1.1 DESCRIPTION**

- A. Furnish all labor, materials, tools, equipment and services for effective project safety and security operations to meet all regulatory requirements in accordance with applicable codes and contract provisions.
- B. The Contractor is to furnish and install any supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a safe and secure project operation. The types of security and protection provisions required include, but are not limited to worker PPE, fire protection, barricades, warning signs/lights, site enclosure fence, sidewalk bridges, building enclosure/lockup, 24/7 site access control, environmental protection, and similar provisions intended to minimize property losses, personal injuries and claims for damages at the project site. No part of such provision(s) shall become the subject of a claim for extension of time or for excess costs or damages by the Contractor.
- C. The Contractor is required to submit a project/site specific safety and security plan to the Owner for review/approval no later than the earlier of thirty (30) calendar days after Notice to Proceed or mobilization to site.

PART 2 - PRODUCTS (NOT USED)**PART 3 - EXECUTION****3.1 SAFETY STANDARDS**

- A. The Contractor shall comply with Federal, State, and local safety and fire codes and regulations and the applicable provisions of the following:
 - 1. Occupational Safety and Health Standards issued by the Secretary of Labor pursuant to the Williams-Steiger Occupational Safety and Health Act of 1970 and as amended.
 - 2. Virginia Occupational Safety and Health Standards for the construction industry.
 - 3. NFPA 70 E – Standards for Electric Safety at Workplace as referenced in OSHA 29 CFR 1926, sub-part K for safety measures, PPE protection from arc flash from electric equipment.
- B. Where requirements conflict, the most stringent requirement shall apply.

3.2 ACCIDENT REPORTS

- A. The Contractor shall maintain an accurate record of, and shall immediately report orally to the Owner, any accidents resulting in death, traumatic injury, occupational disease, or damage of property, materials, supplies, and equipment incident to Work performed under this Contract. The Contractor shall provide a written preliminary accident report to the Owner within 24 hours of occurrence and a complete written report within 7 calendar days.

3.3 PERSONAL PROTECTIVE EQUIPMENT AND EMPLOYEE IDENTIFICATION

- A. The Contractor is responsible for enforcing the use of Personal Protective Equipment (PPE) as required by OSHA and the Virginia Occupational Safety and Health program of the Department of Labor and Industry for General Industry and for the Construction Industry by all personnel and visitors to the site. PPE shall include, as appropriate, eye and face protection, foot protection, hand protection, head

protection, hearing protection, and respiratory protection. At a minimum, all personnel and visitors on site shall have the following:

1. Hard Hat.
 2. Safety Glasses.
 3. Safety Vest.
 4. Safety toe footwear.
- B. Hard hats shall be required at the construction site from start to completion of Work. Each Contractor, employee, and visitor at the construction site shall be required to wear a hard hat. The Contractor shall provide hard hats for visitors as necessary and shall enforce the wearing of hard hats by Contractor employees and visitors. Individuals found not wearing hard hats will not be permitted to remain on site. The Contractor shall be responsible for advising all individuals who will be working on the site of this requirement.
- C. All Contractor and Subcontractor employees are required to provide employee and company identification on their hard hats or shall carry a separate ID card.

3.4 HOUSEKEEPING

- A. The Contractor shall, at all times, keep the site and surrounding property clean and free of unnecessary and hazardous debris. Any damage to surrounding property shall be repaired upon notification by the Owner at no expense to the Owner.
- B. The Contractor shall provide all items required to ensure safety of individuals and property on site.

3.5 FIRE PROTECTION

- A. The Contractor is responsible for compliance with OSHA requirements and local fire codes and regulations as enforced by the governing Fire Marshall or his designated representative. Attention should be called, but not limited to, the following:
5. Proper storage and removal of volatile waste
 6. Proper storage of bottled gasses
 7. On-site storage of fuels
 8. Establishment of smoking areas
 9. Placement of temporary portable fire extinguishers
 10. Employee training
- C. Adequate precautions against fire shall be taken throughout all operations. Flammable material shall be kept at an absolute minimum and shall be properly handled and stored. Fires or open salamanders shall not be permitted in any part of the Work
- D. Construction practices, including cutting and welding and protection during construction, shall be in accordance with the published standards of the National Fire Protection Association.
- E. Store gasoline and other flammable liquids in Underwriters Laboratories-listed safety containers in conformance with the National Board of Fire Underwriters recommendations. Storage, however, shall not be within a building.
- F. Make arrangements for periodic inspection of all construction areas by local fire protection authorities and insurance underwriters. Cooperate with these authorities and promptly carry out their recommendations.

3.6 HAZARDOUS MATERIALS

- A. Hazard Communication Programs: Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the site in accordance with Laws or Regulations.

3.7 POLLUTION CONTROL

- A. The Contractor is responsible for compliance with governing anti-pollution laws and ordinances relative to on-going construction, clean-up, and disposal operations. On-site incineration or burial of items is not allowed.

3.8 SECURITY

- A. The Contractor is responsible for overall security of the construction site. This includes but is not necessarily limited to:
1. Preservation of all property adjacent to the work, the removal or destruction of which is not part of the work of the project. The Contractor shall be responsible, at no additional cost, for all damage or injury to property of any character during the prosecution of the work and he shall restore such property to a condition at least similar and equal to that existing before such damage or injury was done by repairing, rebuilding, or restoring, as may be directed.
 2. Establishing and maintaining perimeter fencing and access gate(s).
 3. Positive site access control including effective use and maintenance of a Visitor Log.
 4. Securing of work in progress and materials stored on site from damage by weather, theft, or vandalism.
 5. Coordination with local police authorities when high value construction material/equipment is expected to be stored on site.

END OF SECTION 013523

SECTION 014000 - QUALITY REQUIREMENTS

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. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection 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 quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
 - 2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
 - 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

- D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform duties of Contractor.
- E. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.4 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in the Statement of Special Inspections attached to this Section, 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 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 015000 - TEMPORARY CONSTRUCTION FACILITIES, UTILITIES AND CONTROLS**1.1 REQUIREMENTS**

- A. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure, and complete installation.
- B. Site Utilization Plan - Prior to the start of work and no later than 30 days after Notice to Award the Contractor shall submit a Site Utilization Plan for Owner review/approval. The plan shall show the locations and dimensions of any area(s) to be fenced and used by the Contractor, the number of trailers and/or sheds to be used, any equipment and material storage areas, access and haul routes, any areas to be graveled, construction entrance(s), trash dumpsters, temporary sanitary facilities, worker parking, project sign, and project bulletin board.
- C. Community Impact - The Contractor shall schedule operations with a minimum of disruption of affected, or neighboring, properties during construction. Consideration shall be given to property access, driveway maintenance, parking, pedestrian traffic, and overall public safety to the maximum extent possible. The Contractor shall abide by all governing ordinances in effect at the job site at the time of construction.

1.2 TEMPORARY UTILITY SERVICES

- A. All utility service accounts whether for temporary or permanent service shall be in the name of the Contractor until the date of Substantial Completion.
- B. Electricity - The Contractor shall furnish and install all temporary electrical facilities as required and shall arrange and pay for all electrical usage until date of Substantial Completion. All temporary facilities shall remain the property of the Contractor and be removed after permanent connections have been completed. Electrical wiring, conduit or equipment which are part of the permanent electrical systems shall not be used for temporary electrical facilities unless specifically approved by the Owner. The Contractor shall be responsible for any damage to equipment and materials, or injury to personnel caused by temporary electrical installations. Costs for materials and installation of temporary electrical facilities shall be at the Contractor's expense.
- C. Water - The Contractor shall make all arrangements to install and pay for all temporary equipment, piping, water meters and outlets for an adequate supply of clean water for construction purposes until date of Substantial Completion. Point of tie-in, meter(s) and hose bibs shall be indicated on the site utilization plan. Contractor shall furnish drinking water for all Contractor and Owner personnel.
- D. Telephone - The Contractor shall make arrangements for and pay all costs associated with telephone service for the temporary site office(s).
- E. Toilets - The Contractor shall provide temporary toilet facilities for the use of Contractor and Owner personnel. Facilities shall comply with local and State sanitary laws and OSHA regulations. The Contractor shall be responsible for maintaining such facilities in a clean, sanitary condition (including provision of adequate supplies of toilet paper and hand sanitizer) throughout the duration of the construction contract.
- F. Heat

1. The Contractor, at his expense, shall furnish, install, and maintain temporary heat and enclosures during contract activities and shall, as applicable, provide heat for specific operations as follows:
 - a. At all times during placing, setting, and curing of concrete and masonry, provide sufficient heat to insure heating of all surrounding spaces involved to not less than 50 degrees F or as specified in the technical specifications.
 - b. From beginning of application of plaster and during the setting and curing period, provide sufficient heat to produce a temperature in spaces involved of not less than 50 degrees F or as specified in the technical specifications.
 - c. For a period of ten (10) days prior to placing interior finishes, and until final acceptance of work or until full occupancy by Owner, provide sufficient heat to produce a temperature in spaces involved of not less than 50 degrees F or as specified in the technical specifications.
 - d. For a period of forty-eight (48) hours previous to installation of floor finishes, provide sufficient heat to produce a temperature of not less than 70 degrees F; maintain this temperature during installation and maintain 55 degrees F temperature for at least 48 hours after installation or as specified in the technical specifications.
 - e. Maintain such heat as practicable to provide satisfactory working conditions for all trades.
2. The Contractor, at his cost, shall provide heat, enclosures, fuel, and services to protect all work and materials against damage from dampness and cold until final acceptance of all work and materials in the Contract, unless the building is occupied by Owner prior to such acceptance.
3. If the Contractor desires operation of the permanent heating system to properly proceed with work, he shall request permission of Architect/Owner in writing. If permission is granted, the Contractor shall accept full responsibility for damage or undue wear to the system and that the one-year warranty will not begin until final acceptance of the project by the Owner.
4. The use of open salamanders and other temporary heating devices which cause smoke and damage will not be permitted. Fuel, equipment, and method of heating shall be satisfactory to the Architect and meeting all regulatory requirements.

1.3 TEMPORARY CONTROLS

A. General

1. Contractor shall provide and maintain methods, equipment, and temporary construction, as required to provide controls over environmental conditions at the construction site and adjacent areas. Remove physical evidence of temporary facilities at completion of the Work.
2. Contractor shall obtain all applicable City, County and State permits required for the construction of all Work, including but not limited to, Hazardous Material Management, and Earth Moving/ Dust Control.

- B. Noise Control - Contractor's vehicles and equipment shall be such as to minimize noise to the greatest degree practicable. Noise levels shall conform to the latest OSHA standards and in no case will noise levels be permitted which interfere with the Work of the Owner or others. The Contractor shall also comply with the *Arlington County Code: Chapter 15-Noise Control*.

C. Dust Control

1. Dust shall be kept down at all times, including non-working hours, weekends, and holidays. Soil at the site, haul roads, and other areas disturbed by the Contractor's operations and materials stockpiled for the project shall be treated with dust suppressors or covered to control dust. No dry power brooming will be permitted. Vacuuming, wet mopping, wet sweeping, or wet power brooming shall be used instead. Air blowing will be permitted only for cleaning off non-particle

debris, such as that from reinforcing bars. Only wet cutting of concrete block, concrete, and asphalt will be permitted.

2. The Contractor shall comply with applicable provisions of the National Emission Standards for Asbestos (40 CFR 61 Subpart B).
3. The Contractor shall inspect vehicles for dirt prior to their leaving the construction site. Dirt, soil, and rubble likely to be dislodge during transit shall be removed from the trucks and other vehicles prior to leaving site.
4. The Contractor shall ensure that material that may become airborne is covered during transport to and from the site. Dump trucks hauling material from the construction site shall be covered with an appropriate covering device.

D. Water Control

1. Provide methods to control surface water and water from excavations and structures to prevent damage to the Work, the Site, or adjoining properties. Control fill, grading and ditching to direct water away from excavations, pits, tunnels and other construction areas and to direct drainage to proper runoff courses so as to prevent any erosion, damage or nuisance.
2. Provide, operate and maintain equipment and facilities of adequate size to control surface water.
3. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the Site or to adjoining areas and in conformance with all environmental requirements.

E. Pollution Control

1. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.
2. Provide equipment and personnel, perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids. Excavate and dispose of any contaminated earth offsite and replace with suitable compacted fill and/or topsoil.
3. Take special measures to prevent harmful substances from entering public waters. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.
4. Provide systems for control of atmospheric pollutants, prevent toxic concentrations of chemicals, and prevent harmful dispersal of pollutants into the atmosphere.
5. All Contractors' equipment used during construction shall conform to all current federal, state and local laws and regulations.

1.4 BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY BOARD

A. Bulletin Board - Immediately upon beginning site work the Contractor shall provide and install a weatherproof, glass-covered bulletin board that is a minimum of three (3) feet high by five (5) feet wide having not less than two (2) hinges or sliding glass doors with provisions for locking. The bulletin board shall be located in a conspicuous place at the project site as approved by the Owner and be easily accessible to all employees. The Contractor shall post all information required by law and the Owner. Information shall remain legible during the course of the Contract. The bulletin board shall remain the property of the Contractor and shall be removed by him upon completion of the Contract.

B. Project Sign - The Owner shall furnish, erect, and maintain a project sign within the limits of the project site. No other signs of any character will be permitted on the premises without written permission granted by the Owner.

- C. Project Safety Board - The Contractor shall erect and maintain a Project Safety Board in a conspicuous and easily accessible place at the project site. The board shall be sized to accommodate OSHA required/recommended postings.

1.5 PROTECTION AND MAINTENANCE OF TRAFFIC

- A. Except as otherwise specifically directed by the Owner, the Contractor shall maintain and protect traffic on all affected roads during the construction period to ensure the traveling public is protected from damage to person or property. Measures for the protection, maintenance, and diversion of traffic shall meet all the requirements of VDOT and Arlington County. The Contractor shall be responsible to submit a Maintenance of Traffic (MOT) Plan to VDOT for approval prior to any work in the VDOT right-of-way. The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with public traffic. The Contractor shall investigate the adequacy of existing roads, the allowable load limit on these roads, and be responsible for the repair of any damage to roads caused by construction operations.
- B. Access Roads - The Contractor shall provide and maintain temporary access to the building site and will accomplish this per methods as approved by the Architect and the Owner so as not to interfere with work of others. When this access is no longer required the Contractor will be responsible for restoration to original or final design state.
- C. Dust, Dirt, and Mud Control - At all points where vehicles leave the project site and enter adjacent paved streets, the Contractor shall maintain a wash rack installation and crew to prevent any mud from being carried onto such adjacent paved streets. The Contractor is responsible for daily cleanup of all debris, materials, etc. that fall from vehicles entering or leaving the site.
- D. Barricades - The Contractor shall erect and maintain temporary barricades to limit public access to hazardous areas. The barricades shall be securely placed, clearly visible, and have adequate illumination to provide sufficient visual warning of the hazard during both day and night.

1.6 TEMPORARY OFFICE FACILITIES

- A. The Contractor shall provide field office(s) for his use and use of the Owner and Architect. The field office(s) should be of adequate size to comfortably accommodate meetings in a single location for twelve (12) people with adequate table space and chairs. The office(s) shall be equipped to maintain a temperature of 72° F at all times during the course of the Contract.

1.7 TEMPORARY SITE PARKING

- A. Construction personnel will not at any time park on any private property without the prior express consent of the property owner. Contractor will be restricted to public parking or space on site as available. Off-site parking should be made in accordance with local laws. Contractor personnel violating this stipulation do so at their own risk and should be aware that their vehicles may be towed at offender's expense.

1.8 TEMPORARY CONSTRUCTION AIDS

- A. Construction Elevators and Hoists - The Contractor shall provide cranes, hoists, towers and other lifting devices for proper and efficient movement of materials and shall provide properly trained and licensed operating personnel for the equipment. Equipment shall be provided with guys, bracing, and other safety devices in accordance with local and Commonwealth of Virginia codes. Remove towers and

hoisting equipment when no longer needed or as directed. All lifting devices and hoisting facilities must be approved by Arlington County prior to use on the job site.

- B. Scaffolding and Platforms - Provide, erect, maintain, and remove when directed, all scaffolding, staging, platforms, temporary runways, temporary flooring, guards, railings, stairs, etc., as required by local agencies having jurisdiction for protection of workmen and public. Construction inspection and maintenance of these items shall comply with all safety codes and regulations as applicable to the project.
- C. Temporary Fences and Barricades - The Contractor shall furnish, install, and maintain all necessary temporary fences, barricades, trench and hole covers, warning lights and all other safety devices necessary to prevent injury to persons and damage to property. The Contractor shall furnish, install, and maintain all temporary barricades at the excavations of the building and openings through floor slabs. The Contractor shall secure the site with a temporary six foot (6'-0") chain link fence and a minimum of two gates for security and safety purposes. This fence should be indicated on the Site Utilization Plan for Owner approval. Contractor shall maintain ownership of the fence and remove it upon completion of the project. Any adjustment to the fence or gate locations during construction to facilitate site access or construction operations will be done at no additional cost to the Owner.
- D. Temporary Pumping - The Contractor shall provide all temporary pumping and dewatering necessary for Contract performance.

1.9 TEMPORARY ENCLOSURES

- A. General Contractor shall furnish and install temporary enclosures, doors and transparent plastic windows required to protect building from damage due to vandalism, or the elements, or to maintain suitable temperature during installation or finishing work.
- B. Provide all items required to ensure safety of individuals on site.

1.10 CLEANUP

- A. All construction debris, waste materials, packaging material and the like shall be removed from the work site daily. Should the Contractor not keep the site clean to Owner's satisfaction, the Owner reserves the right to have the site cleaned by a third party and recover the cost of such operation through back charges to the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 015000

SECTION 015639 - TEMPORARY TREE AND PLANT PROTECTION**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.
- B. Related Requirements:
 - 1. Section 015000 "Temporary Facilities and Controls" for temporary site fencing.
 - 2. Section 311000 "Site Clearing" for removing existing trees and shrubs.

1.3 DEFINITIONS

- A. Caliper: Diameter of a trunk measured by a diameter tape at a height 6 inches (150 mm) above the ground for trees up to and including 4-inch (100-mm) size at this height and as measured at a height of 12 inches (300 mm) above the ground for trees larger than 4-inch (100-mm) size.
- B. Caliper (DBH): Diameter breast height; diameter of a trunk as measured by a diameter tape at a height 54 inches (1372 mm) above the ground line.
- C. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- D. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings.
- E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:
 - a. Tree-service firm's personnel, and equipment needed to make progress and avoid delays.
 - b. Arborist's responsibilities.
 - c. Quality-control program.
 - d. Coordination of Work and equipment movement with the locations of protection zones.

- e. Trenching by hand or with air spade within protection zones.
- f. Field quality control.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and locations of protection-zone fencing and signage, showing relation of equipment-movement routes and material storage locations with protection zones.
 - 2. Detail fabrication and assembly of protection-zone fencing and signage.
 - 3. Indicate extent of trenching by hand or with air spade within protection zones.
- C. Samples: For each type of the following:
 - 1. Organic Mulch: 1-pint volume of organic mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
 - 2. Protection-Zone Fencing: Assembled Samples of manufacturer's standard size made from full-size components.
 - 3. Protection-Zone Signage: Full-size Samples of each size and text, ready for installation.
- D. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
 - 1. Species and size of tree.
 - 2. Location on site plan. Include unique identifier for each.
 - 3. Reason for pruning.
 - 4. Description of pruning to be performed.
 - 5. Description of maintenance following pruning.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For arborist and tree service firm.
- B. Certification: From arborist, certifying 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.
- C. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.
- D. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.
 - 1. Use sufficiently detailed photographs or video recordings.
 - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.
- E. Quality-control program.

1.7 QUALITY ASSURANCE

- A. Arborist Qualifications: Certified Arborist as certified by ISA and Licensed arborist in jurisdiction where Project is located.
- B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.
- C. Quality-Control Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work without damaging trees and plantings. Include dimensioned diagrams for placement of protection zone fencing and signage, the arborist's and tree-service firm's responsibilities, instructions given to workers on the use and care of protection zones, and enforcement of requirements for protection zones.

1.8 FIELD CONDITIONS

- A. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Moving or parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.
 - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- B. Do not direct vehicle or equipment exhaust toward protection zones.
- C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Backfill Soil: Stockpiled soil from location shown on Drawings or Planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.
 - 1. Planting Soil: Planting soil as specified in Section 329113 "Soil Preparation".
- B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:
 - 1. Type: Shredded hardwood.
 - 2. Size Range: 3 inches maximum, 1/2 inch minimum.
 - 3. Color: Natural.

- C. Protection-Zone Fencing: Fencing fixed in position and as noted on drawings.
- D. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering and as noted on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- B. Prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

- A. Locate and clearly identify trees, shrubs, and other vegetation to remain. Flag each tree trunk at 54 inches (1372 mm) above the ground.
- B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

3.3 PROTECTION ZONES

- A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected areas except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
 - 1. Chain-Link Fencing: Install to comply with ASTM F 567 and with manufacturer's written instructions.
 - 2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.
 - 3. Access Gates: Install; adjust to operate smoothly, easily, and quietly; free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect. Install one sign spaced as shown on drawings.
- C. Maintain protection zones free of weeds and trash.
- D. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.

1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

- A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 312000 "Earth Moving" unless otherwise indicated.
- B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots.
- C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches (75 mm) back from new construction and as required for root pruning.
- D. 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.

3.5 ROOT PRUNING

- A. Prune tree roots that are affected by temporary and permanent construction. Prune roots [as shown on Drawings.

3.6 CROWN PRUNING

- A. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by arborist.
 1. Prune to remove only injured, broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
 2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
 3. Pruning Standards: Prune trees according to ANSI A300 (Part 1).
- B. Unless otherwise directed by arborist and acceptable to Architect, do not cut tree leaders.
- C. Cut branches with sharp pruning instruments; do not break or chop.
- D. Do not paint or apply sealants to wounds.
- E. Provide subsequent maintenance pruning during Contract period as recommended by arborist.

- F. Chip removed branches and dispose of off-site.

3.7 REGRADING

- A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
- B. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

3.8 FIELD QUALITY CONTROL

- A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.9 REPAIR AND REPLACEMENT

- A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Architect.
 - 1. Submit details of proposed pruning and repairs.
 - 2. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.
 - 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.
- B. Trees: Remove and replace trees indicated to remain that are more than **25** percent dead or in an unhealthy condition or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove excess excavated material, displaced trees, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 015639

SECTION 016310 - PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling requests for substitutions made after award of the Contract.
- B. The Contractor's Construction Schedule and the Schedule of Submittals are included under Section "Submittals."
- C. Standards: Refer to Section "Definitions and Standards" for applicability of industry standards to products specified.
- D. Procedural requirements governing the Contractor's selection of products and product options are included under Section "Materials and Equipment."

1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change or modify the meaning of other terms used in the Contract Documents.
- B. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions." The following are not considered substitutions:
 - 1. Substitutions requested by Bidders during the bidding period, and accepted prior to award of Contract, are considered as included in the Contract Documents and are not subject to requirements specified in this Section for substitutions.
 - 2. Revisions to Contract Documents requested by the Owner or Architect.
 - 3. Specified options of products and construction methods included in Contract Documents.
 - 4. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.4 SUBMITTALS

- A. Substitution Request Submittal: Requests for substitution will be considered if received within 60 days after award of contract. Requests received more than 60 days after award of contract may be considered or rejected at the discretion of the Architect and Owner.
 - 1. E-mail each request for substitution for consideration to the Owner and the Architect. Submit requests in the form and in accordance with procedures required for Change Order proposals.
 - 2. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete

documentation showing compliance with the requirements for substitutions, and the

following information, as appropriate:

- a. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
 - b. Samples, where applicable or requested.
 - c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
 - d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors, that will become necessary to accommodate the proposed substitution.
 - e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
 - f. Cost information, including a proposal of the net change, if any in the Contract Sum.
 - g. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time, that may subsequently become necessary because of the failure of the substitution to perform adequately.
3. Architect's Action: Within ten days of receipt of the request for substitution, the Architect will request additional information or documentation necessary for evaluation of the request. Within three weeks of receipt of the request, or one week of receipt of the additional information or documentation, whichever is later, the Architect will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name. Acceptance will be in the form of a Change Order.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Conditions: The Contractor's substitution request will be received and considered by the Architect when one or more of the following conditions are satisfied, as determined by the Architect; otherwise requests will be returned without action except to record noncompliance with these requirements.
1. Revisions to Contract Documents are not required.
 2. Proposed changes are in keeping with the general intent of Contract Documents.
 3. The request is timely, fully documented and properly submitted.
 4. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
 5. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
 6. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Architect for redesign and evaluation services, increased cost of

- other construction by the Owner or separate Contractors, and similar considerations.
7. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
 8. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provide the required warranty.
 9. The Contractor shall provide appropriate credit for substitute material, equipment, labor etc. if the substitution is acceptable to the Architect, Engineer and County.
- B. The Contractor's submittal and Architect's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 016310

SECTION 017329 - CUTTING AND PATCHING**PART 1 – GENERAL****1.1 QUALITY ASSURANCE**

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
- B. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.
- C. Operational Limitations: do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.
- D. Visual Requirements: Do not cut and patch construction exposed on exterior or in occupied spaces in a manner that would, in the Architect's opinion, reduce the building's aesthetic or visual qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction that was cut and patched in a visually unsatisfactory manner.
- E. Warranty or existing warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

1.2 DESCRIPTION

- A. Install Work in such a manner and sequence as to preclude or minimize cutting and patching of new Work.
- B. Execute cutting (including excavation), fitting or patching of Work, required to:
 - 1. Make several parts fit properly.
 - 2. Uncover Work to provide for installation of ill-timed Work.
 - 3. Remove and replace defective Work.
 - 4. Remove and replace non-conforming Work.
 - 5. Remove samples of installed Work for testing.
 - 6. Install specified Work in existing construction.
 - 7. Provide rerouting penetrations of non-structural surfaces for installation of piping and electrical conduit.
 - 8. Patch and repair fireproofing damaged after installation of other Work or demolition activities.
 - 9. Remove and finish construction at connections to other structures.
 - 10. Remove existing materials where required by new Work, and patch to match existing adjacent materials to remain.
- C. Do not endanger any Work or any Work of other Contractors, by cutting, excavating, or otherwise altering any Work except with written consent of Contractor subject to review by Architect.
- D. Do not cut into or cut away any structural concrete or other structural members or other concrete, and do not dig under any foundations or into structural walls or other parts, or in any case do not allow same to be done without full knowledge and written consent of Architect.
- E. Correct damage resulting from violation of these provisions.
- F. Use only firms or individual trades qualified to perform Work required under this Section.

1.3 JOB CONDITIONS

- A. Before start of Work, obtain and pay for all permits required by all authorities having jurisdiction and notify all interested utilities companies.
- B. Obtain approval of Owner and authorities having jurisdiction for Work which affects existing exitways, exit stairs, means of egress, or access to, or exit from, areas. Review with and obtain approval of authorities for any temporary construction that affects such areas.
- C. Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- D. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- E. Avoid cutting existing utilities, pipe, conduit or ductwork serving the building but scheduled to be removed or relocated until alternate provisions have been provided.
- F. Items to be salvaged and delivered to Owner shall be carefully removed and properly stored in an area easily accessible for removal by Owner.

1.4 PAYMENT FOR COSTS

- A. Costs associated with repair or replacement of non-coordinated or defective Work, or Work not conforming to Contract Documents, shall be paid by Contractor.

PART 2 - PRODUCTS

1.5 MATERIALS - GENERAL

- A. Use materials identical to existing materials.
- B. For exposed surfaces, use materials that visually match existing adjacent surfaces or use materials that visually match existing adjacent surfaces to the fullest extent possible if identical materials are unavailable or cannot be used.
- C. Use materials whose installed performance will equal or surpass that of existing materials.
- D. Where applicable, comply with specifications for type of Work to be performed.

PART 3 - EXECUTION

1.6 INSPECTION

- A. Prior to the bid, Contractor shall review all existing facilities that are related to this contract and shall be familiar with all utility requirements and construction.
Existing facility documents may be available through the Owner for review.
- B. Perform preliminary investigations as required to ascertain extent of Work.
Conditions that would be apparent by such investigation will not be allowed as cause for claims for extra costs.
- C. Inspect existing conditions for work, including elements subject to movement or damage during:
 - 1. Cutting and patching.
 - 2. Excavating and backfilling.
- D. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.
- E. Before proceeding, meet at Project Site with parties involved in cutting and patching, including mechanical and electrical trades.
 - 1. Review areas of potential interference and conflict.
 - 2. Coordinate procedures and resolve potential conflicts before proceeding.

- F. After uncovering existing conditions for Work, inspect conditions affecting installation of new products or Work.

1.7 PREPARATION PRIOR TO CUTTING

- A. Provide adequate shoring, bracing and support as required to maintain structural integrity of Project.
- B. Provide protection for other portions of Project that may be affected.
- C. Provide protection from adverse weather conditions.

1.8 CUTTING AND REMOVAL - GENERAL

- A. Execute fitting and adjustment to provide finished installation to comply with specified tolerances and finishes.
- B. Execute cutting by methods that will prevent damage to existing or other Work and will provide proper surfaces to receive installation of new Work.
- C. Perform backfilling as specified in applicable sections.
- D. Neatly cut and remove materials, and prepare all openings to receive new work.
- E. Remove masonry or concrete in small sections.
- F. Provide shoring, bracing, and other supports to prevent movement, settlement, or collapse of remaining or adjacent wall areas, structure, or facilities.
- G. Arrange shoring, bracing, and supports to prevent overloading of structure.
- H. Take all precautions necessary to prevent damage to existing remaining work or to adjacent facilities.
- I. Execute Work using methods that will prevent interference with use of remaining and adjacent facilities by Owner.
- J. Remove existing work indicated to be removed, or as necessary for installation of new Work.
- K. Provide for cutting, fitting, repairing, patching and finishing of Work disturbed by installation of new Work.
- L. Do not remove or damage fireproofing materials.
 - 1. Install hangers, inserts, supports, and anchors prior to installation of fireproofing.
 - 2. Repair or replace fireproofing damaged.

1.9 CUTTING IN CONCRETE CONSTRUCTION

- A. Do not cut into nor core drill openings or holes in beams, joists, and columns without prior written approval of Architect. When written approval is obtained, comply with additional requirements and instructions of Architect.
- B. In members other than beams, joists, and columns; where an opening larger than 10 inches in any dimension is required, or where dimension between 2 openings is less than 2 times maximum dimension of largest opening, and condition is not shown on architectural or structural drawings, obtain prior written approval of Architect.
 - 1. At floor slabs and walls to be core drilled or cut, contractor shall find and mark all reinforcing in both faces located by means of x-ray, pach-ometer, or prof-ometer. Submit sketch showing location of rebar and proposed cuts or cores for review.
 - 2. When written approval is obtained, comply with additional requirements and instructions of Architect.

1.10 CUTTING IN POST TENSIONED CONCRETE CONSTRUCTION

- A. Do not cut into nor core drill openings or holes in beams or joists.
- B. Do not cut into nor core drill openings or holes in slabs without prior written approval of Architect. When approval is obtained, comply with additional requirements and instructions of Architect.
- C. Openings not greater than 6 inches in any dimension are permitted in flat slab portions of construction except that such openings shall not interfere with or disturb strands. Do not place closer than 12 inches to any column face, or closer than 24 inches to any post tensioning strand anchor.

1.11 CUTTING IN PRECAST/PRESTRESSED CONCRETE CONSTRUCTION

- A. Do not cut openings or core drill vertically or horizontally through stems of members.
- B. Openings smaller than 6 inches diameter or 6 inches maximum dimension may be cut in flanges of units after obtaining prior written approval of Architect. When approval is obtained, comply with instructions of Architect.

1.12 CUTTING IN STEEL FRAME AND METAL DECK CONSTRUCTION

- A. Do not cut nor drill holes in webs and flanges of columns, beams, purlins, and joists without prior written approval of Architect. When approval is obtained, comply with requirements and instructions of Architect and provide reinforcing at such locations when required.
- B. When openings are cut into metal decks having cast-in-place concrete slab over metal deck:
 - 1. No reinforcing of holes is required for circular openings or sleeves up to 6 inches diameter and for rectangular openings having no side dimension greater than 6 inches.
 - 2. Reinforce openings greater than 6 inches.
 - 3. Obtain prior written approval of Architect for openings not shown on architectural or structural drawings. Comply with additional requirements and instructions of Architect.
- C. When openings are cut into metal roof decks that have lightweight insulating cementitious roof fill or no concrete cast-in-place over deck:
 - 1. No reinforcing of holes is required for circular openings less than 6 inches diameter and for rectangular openings having no side dimension greater than 6 inches.
 - 2. Reinforce openings between 6 inches and 12 inches, with 20 Gauge flat steel sheet 12 inches greater in dimension than opening; fusion weld to top surface of deck at each corner and on each side midway between corners.
 - 3. Do not cut openings greater than 12 inches without prior written approval of Architect. Comply with requirements and instruction of Architect.

1.13 MATCHING AND PATCHING

- A. Where items are removed from existing walls, ceilings, floors or partitions to remain, repair wall, ceiling, floor or partition disturbed by removal.
- B. Where walls, ceilings, floors or partitions are removed, repair abutting walls, ceilings or floors disturbed by removal.
- C. Where existing construction is cut, removed or otherwise disturbed to permit installation of new Work, match and patch existing disturbed construction.
- D. Use methods and materials similar in appearance, and equal in quality to areas or surfaces being repaired.
- E. Restore Work that has been cut or removed; install new products to provide completed Work in accord with requirements of Contract Documents.

- F. Patch Work must in every way possible match existing work and adjacent surfaces.
- G. Re-finish entire surfaces as necessary to provide an even finish to match adjacent finishes.
 - 1. Continuous surfaces: To nearest intersections.
 - 2. Assembly: Entire refinishing.
- H. In existing areas remove and replace existing ceilings and finishes for installation of Work, if not shown to be removed on Architectural Drawings and Schedules.
 - 1. If existing ceiling cannot be satisfactorily reinstalled, replace with like materials and construction.
 - 2. Replace damaged construction with like materials.

END OF SECTION 017329

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**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. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.
- B. Related Requirements:
 - 1. Section 311000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.
- C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition and construction waste becomes property of Contractor.

- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

- 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 15 days of the Notice to Proceed.

1.6 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:

- 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in tons.
 - 4. Quantity of waste salvaged, both estimated and actual in tons.
 - 5. Quantity of waste recycled, both estimated and actual in tons.
 - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

- G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Universal certified by EPA-approved certification program.

- B. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.

1.8 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 - 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work in compliance with Section 024116 "Structure Demolition" and section 024119 "Selective Demolition."
 - 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 - 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 - 6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total nonhazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - 1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."
- B. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
 - 2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

- A. Comply with requirements in Section 024116 "Structure Demolition" and Section 024119 "Selective Demolition" for salvaging demolition waste.
- B. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until installation.
 - 4. Protect items from damage during transport and storage.
 - 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- C. Salvaged Items for Sale and Donation: Permitted on Project site.
- D. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area on-site designated by Owner.
 - 5. Protect items from damage during transport and storage.
- E. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
- F. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

- G. Plumbing Fixtures: Separate by type and size.
- H. Lighting Fixtures: Separate lamps by type and protect from breakage.
- I. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - 4. Store components off the ground and protect from the weather.
 - 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor as often as required to prevent overfilling bins.

3.4 RECYCLING DEMOLITION WASTE

- A. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.
- B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
 - 1. Pulverize concrete to maximum 4-inch size.
 - 2. Crush concrete and screen to comply with requirements in Section 312000 "Earth Moving" for use as satisfactory soil for fill or subbase.
- C. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
 - 1. Pulverize masonry to maximum 1-1/2-inch size.
 - 2. Clean and stack undamaged, whole masonry units on wood pallets.

- D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
 - E. Metals: Separate metals by type.
 - 1. Structural Steel: Stack members according to size, type of member, and length.
 - 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
 - F. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
 - G. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
 - H. Metal Suspension System: Separate metal members, including trim and other metals from acoustical panels and tile, and sort with other metals.
 - I. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
 - 1. Store clean, dry carpet and pad in a closed container or trailer provided by carpet reclamation agency or carpet recycler.
 - J. Carpet Tile: Remove debris, trash, and adhesive.
 - 1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by carpet reclamation agency or carpet recycler.
 - K. Piping: Reduce piping to straight lengths and store by material and size. Separate supports, hangers, valves, sprinklers, and other components by material and size.
 - L. Conduit: Reduce conduit to straight lengths and store by material and size.
 - M. Lamps: Separate lamps by type and store according to requirements in 40 CFR 273.
- 3.5 RECYCLING CONSTRUCTION WASTE
- A. Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - 2. Polystyrene Packaging: Separate and bag materials.
 - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
 - B. Wood Materials:
 - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
 - C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

- D. Paint: Seal containers and store by type.

3.6 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. General: Except for items or materials to be salvaged or recycled, remove waste materials and legally dispose of at designated spoil areas on Owner's property.
- C. Burning: Do not burn waste materials.

END OF SECTION 017419

SECTION 017700 - SUBSTANTIAL COMPLETION**PART 1 - GENERAL**

- 1.1 The Contractor is to furnish all labor, materials, and data necessary to achieve substantial completion in accordance with applicable Contract provisions.
- 1.2 Impacts resulting from the Contractor's failure to meet Substantial Completion per Contract requirements shall in no part become the subject of a claim for extension of time or for excess costs or damages by the Contractor.

PART 2 - PRODUCTS (NOT USED)**PART 3 - EXECUTION****3.1 PREREQUISITES**

- A. The Contractor shall have completed all of the following items of work prior to requesting the Owner's Substantial Completion Inspection:
 1. Obtain a Non-Residential Use Permit for the Project or designated portion thereof.
 2. Equipment Demonstration and Owner Personnel Instruction.
 3. Maintenance Materials, Specialty Tools and Spare Parts
 - a. The Contractor shall provide any "special" or "proprietary" tools which may be required for general maintenance and service of equipment and systems.
 - b. In addition to the requirements of the technical specification sections the Contractor is to provide all materials, spare parts, tools, and "attic supplies" necessary for general operations and maintenance during the warranty period. Such items shall be packed in boxes clearly identifying:
 - I. The trade name and stock number
 - II. Where item material is to be used
 - III. The name, address and phone number of closest supplier
 - IV.
 4. Operation/Maintenance and Warranty Manuals (ref Specification 017823)
 5. If required by Contract, submission of LEED Certification Documentation (as detailed in Division 1 of the project specifications).
 - a. LEED documentation collected by the Contractor shall be assembled in a 3-ring binder in a format similar to the requirements for Operation/Maintenance and Warranty Manuals.
 - b. All LEED information shall be submitted two weeks prior to the date of Substantial Completion.
 6. Submission of As-Built drawings and specifications (ref Specification 017839)
 7. Submission of certificate of final inspection from city, county and/or state agencies in accordance with applicable codes, laws, and ordinances to include but not limited to:
 - a. VDOT
 - b. Contractor's Certified Arborist, if one is required
 - c. Fire Marshal

- d. For projects subject to the Arlington County Special Inspections program, assure that the Special Inspections Engineer of Record has completed the Final Report of Special Inspections prior to seeking final building inspection.

8. Final Cleaning

- a. All items/surfaces shall be free of stains, dirt, damage, labels, foreign materials or other defects
 - b. Wash, sweep, polish or vacuum all finished wall surfaces, floors, windows, hardware, mirrors, lighting fixtures and items of equipment
 - c. Replace damaged or defaced items and re-clean items not acceptable to Owner/Architect
 - d. As appropriate broom clean exterior paved surfaces and rake clean other surfaces within the limits of the project site
 - e. As appropriate, clean ducts, blowers, coils, and replace air conditioning filters in all operating HVAC system(s)
 - f. Remove any remaining waste, surplus materials and/or rubbish from the site
 - g. Reference individual technical specifications for additional cleaning requirements
 - h. Final cleaning operations are to be conducted by a company experienced and licensed in such a service. Owner/Architect shall have right of review/approval of the cleaning subcontractor.
 - i. Coordinate cleaning materials/methods with the LEED requirements specified elsewhere.
9. Submission of a Non-Use of Asbestos Affidavit.
 10. Submission of final reports to the Owner/Architect for the testing, adjusting and environmental systems including, but not limited to: air distribution systems, hot water heating systems, chilled water systems, condenser water systems and the equipment and apparatus connected thereto.
 11. Demonstration in the Owner's off-site location that the Building Automation System graphics have been installed and that the systems can be remotely controlled/monitored. For the purpose of obtaining Substantial Completion, the Commissioning Agent shall verify the graphics and remote control are functional and that all systems are in general conformance with contract requirements. Note that detailed commissioning on a seasonal basis may not be complete at this time.
 12. All commissioning functional testing shall be completed satisfactorily prior to the issuance of substantial completion.

3.2 REQUEST FOR SUBSTANTIAL COMPLETION INSPECTION

- A. Upon completion of the Pre-Requisites for Substantial Completion the Contractor shall:
 1. Submit written certification to the Owner that the Project, or, subject to Owner approval, a designated portion of the Project, is substantially complete
 2. Submit a listing to the Owner/Architect of all items yet to be completed or to be corrected. If the Owner/Architect determines that the list of such items is incomplete or too extensive, the Owner reserves the right to delay the substantial completion inspection. Such delay shall have no cost impact to the Owner.
- B. Substantial Completion Inspection should start no later than five (5) working days after the Contractor's request and Owner/Architect concurrence of readiness. Inspection shall be made with representatives of the Contractor and the Owner/Architect.
 1. Should the joint inspection find that work is substantially complete the Owner/Architect shall prepare a punch list of items to be completed or corrected by the Contractor in conformance with the Contract documents.

The final punch list shall also include those items from all city, county and/or state agencies including but not limited to those identified in 3.1.A.7 above.

2. Should the joint inspection find that work is not substantially complete:
 - a. The Owner/Architect shall immediately notify the Contractor accordingly and follow up such notice in writing stating the reasons. In order to expedite the completion process a punch list of items to be completed or corrected may be also issued at this time. The Contractor shall complete all items on this punch list within forty five (45) calendar days after issuance and send a second written notice to the Owner certifying that the Project, or subject to Owner approval, a designated portion of the Project, is substantially complete.
 - b. Owner/Architect shall schedule a second inspection.

3.3 ISSUANCE OF CERTIFICATE OF SUBSTANTIAL COMPLETION

- A. The Architect shall prepare and issue a Certificate of Substantial Completion, AIA G704, for the signatures of Owner and Contractor, accompanied by a list of items remaining to be completed or corrected.
- B. The Contractor shall have thirty (30) calendar days after the established date of Substantial Completion to complete all items on the final punch list. The Owner shall have the option to correct or conclude by others any punch list item not completed by the Contractor by the 45th day. The cost of the work by others shall be deducted from the final payment to the Contractor.
- C. If the Contractor completes all items of work on the final punch list within the specified forty five (45) calendar days the date of the Certificate of Substantial Completion shall be the date from which all warranties and guarantees commence.
- D. If all items are not complete within forty five (45) calendar days, then all warranties and guarantees required in these specifications will become effective upon issuance of final payment for the project. It shall also state the responsibilities of the Owner and the Contractor for security, maintenance, heat, utilities, damage to the work, and insurance.
- E. The issuance of the Certificate of Substantial Completion does not indicate final acceptance of the project by the Owner and the Contractor is not relieved of any responsibility for the project except those outlined in the document.

END OF SECTION 017700

SECTION 017800 - CLOSE-OUT AND WARRANTY PERFORMANCE**PART 1 - GENERAL**

- 1.1 The Contractor is to furnish all labor, materials, and data necessary to support project close-out activities in accordance with applicable Contract provisions.
- 1.2 Impacts resulting from the Contractor's failure to achieve timely close-out shall in no part become the subject of a claim for extension of time or for excess costs or damages by the Contractor.
- 1.3 **RELATED SPECIFICATION SECTIONS**
 - A. Section D General Conditions
 - B. 017839 As-Built Documentation
 - C. 017700 Substantial Completion

PART 2 - PRODUCTS (NOT USED)**PART 3 - EXECUTION****3.1 FINAL INSPECTION**

- A. The Contractor shall request final inspection once all Contract work has been confirmed as complete. Completion of work shall also include those items identified from all city, county and/or state agencies including but not limited to those identified in Section 017700 paragraph 3.1.A.7.
- B. Final Inspection should occur no later than ten (10) working days after the Contractor's request and Owner/Architect concurrence of readiness. Inspection(s) shall be made with representatives of the Contractor, state and local agencies and the Owner/Architect.
- C. Should the joint Final Inspection find that work is not complete:
 1. The Owner/Architect shall immediately notify the Contractor accordingly and follow up such notice in writing stating the reasons. In order to expedite the completion process, a punch list of items to be completed or corrected may be also issued at this time. The Contractor shall complete all items on this punch list within Seven (7) calendar days after issuance and send a second written notice to the Owner certifying that the Project is complete. The Owner has the right to complete any items not completed within time frames stated above and deduct all related costs from the Contract.
 2. Owner/Architect shall schedule a second inspection.

3.2 FINAL APPLICATION FOR PAYMENT

- A. Prior to submitting the Request for Final Payment, the Contractor shall submit the "Contractors Certificate of Final Completion" and all documents required therein. See Appendix A for a copy of the required Certificate.
- B. When the Owner/Architect notifies the Contractor that they find the work acceptable under the Contract documents and the Contract fully performed, and the Contractor has satisfactorily submitted the "Contractors Certificate of Final Completion" and all documents required therein, he may submit a Final Certificate for Payment.

3.3 WARRANTY PERFORMANCE

- A. The Contractor's Performance Bond shall remain effective throughout the life of all warranties and warranty extensions. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the Owner will have the work performed by others, and after completion of the work, will charge any remaining contract funds for expenses incurred by the Owner while performing the work, including, but not limited to administrative expenses. In the event sufficient funds are not available to cover the construction warranty work performed by the Owner at the Contractor's expense, the Owner will have the right to recoup expenses from the Contractor's Bonding Company.
- B. Following oral or written notification of the required construction warranty repair work, the Contractor shall respond within one working day of his intentions/actions in pursuit of the warranty repair. The Owner will follow any oral instructions with written verification. Failure of the Contractor to respond will be cause for the Owner to proceed against the Contractor.
- C. Warranty Repair Priority
1. The severity of the warranty issue will be evaluated by the Owner and a Response Priority assigned to the notice as followings:
 - a. First Priority Code 1 – Contractor to provide on-site inspection to evaluate the situation and determine the course of action within four (4) hours, initiate the work within six (6) hours and work continuously to completion or relief.
 - b. Second Priority Code 2 – Perform on-site inspection to evaluate the situation and determine the course of action within eight (8) hours, initiate the work within 24 hours and work continuously to completion or relief
 - c. Third Priority Code 3 – Necessary work to be initiated within three working days and work performed during standard work hours each subsequent day to completion or relief.
- D. Contractor's Response to Construction Warranty Requirements
1. Following the oral or written notification by the Owner, the Contractor shall respond to construction warranty service requirements in accordance with the assigned Response Priority code. The Contractor shall submit a report within seven (7) calendar days after completion of activities on any warranty item that has been repaired during the warranty period. The report shall include:
 - a. The cause of the problem
 - b. The date/time reported
 - c. The assigned Response Priority Code
 - d. Corrective action taken
 - e. When repairs were completed
- E. If the Contractor does not perform the construction warranty items within the time frames specified above, the Owner retains the right to perform the work and recover all costs from the Contractor.

END OF SECTION 017800

SECTION 017839 - AS-BUILT DOCUMENTATION**PART 1 - GENERAL**

- 1.1 The Contractor is to furnish all labor, materials, and data necessary to maintain and produce project As-Built drawings and specifications in accordance with applicable Contract provisions.
- 1.2 Impacts resulting from the Contractor's failure to meet As-Built requirements shall in no part become the subject of a claim for extension of time or for excess costs or damages by the Contractor.
- 1.3 The terms 'drawings', "contract drawings", "drawing files", "working as-built drawings", and "final as-built drawings" all refer to contract drawings which are revised to be used for final as-built drawings.
- 1.4 **RELATED SPECIFICATION SECTIONS**
 - A. Section B GENERAL CONDITIONS
 - B. Section 017700 SUBSTANTIAL COMPLETION
 - C. Section 017800 CLOSE-OUT AND WARRANTY PERFORMANCE

PART 2 - PRODUCTS (NOT USED)**PART 3 - EXECUTION****3.1 AS-BUILT POSTING DURING CONSTRUCTION**

- A. The Contractor shall revise paper drawings and specifications by red-line process to show the as-built conditions during the execution of the project. These working as-builts shall be kept current on a weekly basis and at least one set shall be available for review at the jobsite at all times. Changes from the contract documents which are made in the work or additional information which might be uncovered in the course of construction shall be accurately and neatly recorded as they occur by means of details and notes on the drawings. The working as-built documents will be jointly reviewed for accuracy and completeness by the Owner/Architect and the Contractor prior to each of the Contractor's monthly Applications for Payment.

3.2 PAYMENT

- A. Final payments will be held until the complete set of red-line drawings are submitted to and approved by the Project Officer.

3.3 CONTENT

- A. The As-Built packages shall be submitted as follows:
 1. Project Record As-Built Plans
 - a. The Contractor shall submit two paper sets and two (2) electronic copies of red-lined Contract drawings and specifications for review and approval of the Owner/Architect. The documents should be marked to reflect actual civil, architectural, structural, electrical, plumbing, mechanical, and other trades final as-built conditions of the project.
 - b. Label each set of documents "RECORD AS-BUILTS". Have skilled draftspersons and typists transfer all changes, corrections, and entries.
 - c. Submission information should minimally include the following:

- 1) Changes in details of design or additional information obtained from working drawings and specifications including but not limited to fabrication, erection, material changes/substitutions, installation plans and placing details, etc.
- 2) Where contract drawings or specifications present options, only the option selected for construction shall be shown.
- 3) Changes or modifications resulting from the substantial completion or final inspections.
- 4) Changes or modifications brought about as a result of a Request for Information, Architect's Supplemental Instructions, Field Order, or Change Order.
- 5) Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
- 6) Final location and depth of all utilities on the property.
- 7) Field changes of dimension and/or detail.

END OF SECTION 017839

SECTION 024116 - STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of buildings and site improvements.
2. Removing or Abandoning in-place below-grade construction as indicated.
3. Disconnecting, capping or sealing, and removing site utilities.
4. Salvaging items for reuse by Owner.

B. Related Requirements:

1. Section 011000 "Summary" for use of the premises and phasing requirements.
2. Section 013233 "Project Reporting and Photographs" for preconstruction photographs taken before building demolition.
3. Section 024119 "Selective Demolition" for partial demolition of buildings, structures, and site improvements.
4. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade site improvements not part of building demolition.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store. Include fasteners or brackets needed for reattachment elsewhere.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be demolished.
 - 2. Review structural load limitations of existing structures.
 - 3. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review and finalize protection requirements.
 - 5. Review procedures for noise control and dust control.
 - 6. Review procedures for protection of adjacent buildings.
 - 7. Review items to be salvaged and returned to Owner.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
 - 1. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain including means of egress from those buildings.
- D. Schedule of Building Demolition Activities: Indicate the following:
 - 1. Detailed sequence of demolition work, with starting and ending dates for each activity.
 - 2. Temporary interruption of utility services.
 - 3. Shutoff and capping of utility services.
- E. Predemolition Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by salvage and demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before the Work begins.
- F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

1.9 FIELD CONDITIONS

- A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.
- B. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.
 - 1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
 - 2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.
 - a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.
- C. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- D. Hazardous Materials: Hazardous materials are present in the existing building. The contractor shall remove and dispose of all hazardous materials in accordance with all federal state and local laws.
 - 1. The extent of the hazardous materials is outlined in the attached documents:
 - a. Report dated 11/22/2019 by ECS titled "LIMITED HAZARDOUS MATERIALS SURVEY: ROOFS AND EXTERIOR AREAS OF VEIRGINIA HOSPITAL CENTER."
 - b. Report dated 11/4/2019 by AMA, Inc. titled "HAZARDOUS MATERIALS INSPECTION REPORT OF THE VIRGINIA HOSPITAL CENTER FACILITY LOCATED AT 601 S. CARLIN SPRINGS ROAD ARLINGTON, VIRGINIA."
 - 2. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 3. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- E. On-site storage or sale of removed items or materials is not permitted.

1.10 COORDINATION

- A. Arrange demolition schedule so as not to interfere with operations of adjacent occupied buildings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

2.2 SOIL MATERIALS

- A. Satisfactory Soils: Comply with requirements in Section 312000 "Earth Moving."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.
- D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- F. Inventory and record the condition of items to be removed and salvaged.

3.2 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.
- B. Salvaged Items: Comply with the following:
 - 1. Clean salvaged items of dirt and demolition debris.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to storage area designated by Owner.
 - 5. Protect items from damage during transport and storage.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Utilities to be Disconnected: Locate, identify, disconnect, and seal or cap off utilities serving buildings and structures to be demolished.
 - 1. Owner will arrange to shut off utilities when requested by Contractor.
 - 2. Arrange to shut off utilities with utility companies.
 - 3. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
 - 4. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
 - 5. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.4 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.
- B. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of demolition.
- C. Existing Utilities to Remain: Maintain utility services to remain and protect from damage during demolition operations.
 - 1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
 - 2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.
 - a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.
- D. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Section 015000 "Temporary Facilities and Controls."
 - 1. Protect adjacent buildings and facilities from damage due to demolition activities.
 - 2. Protect existing site improvements, appurtenances, and landscaping to remain.
 - 3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
 - 4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 5. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
 - 6. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
 - 7. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.
- E. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.5 DEMOLITION, GENERAL

- A. General: Demolish indicated buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
 - 2. Maintain fire watch during and for at least 1 hours after flame-cutting operations.
 - 3. Maintain adequate ventilation when using cutting torches.
 - 4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

- B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed trafficways if required by authorities having jurisdiction.
 - 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- C. Explosives: Use of explosives is not permitted.

3.6 DEMOLITION BY MECHANICAL MEANS

- A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.
- B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.
- C. Below-Grade Construction: Demolish foundation walls and other below-grade construction.
 - 1. Remove below-grade construction, including basements, foundation walls, and footings, completely.
- D. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures within the building footprint and beyond to the extent shown.
- E. Hydraulic Elevator Systems: Demolish and remove elevator systems, including cylinder, plunger, well assembly, steel well casing and liner, oil supply lines, and tanks.

3.7 SITE RESTORATION

- A. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with according to backfill requirements in Section 312000 "Earth Moving."
- B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.8 REPAIRS

- A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.9 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Do not burn demolished materials.

3.10 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.
 - 1. Clean roadways of debris caused by debris transport.

END OF SECTION 024116

SECTION 311000 - SITE CLEARING**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Protecting existing vegetation to remain.
 2. Removing existing vegetation.
 3. Clearing and grubbing.
 4. Stripping and stockpiling topsoil.
 5. Stripping and stockpiling rock.
 6. Removing above- and below-grade site improvements.
 7. Disconnecting, capping or sealing, removing site utilities and abandoning site utilities in place.
 8. Temporary erosion and sedimentation control.
- B. Related Sections:
1. Section 015000 - Temporary Construction Facilities, Utilities and Controls.
 2. Division 26 – Electrical
 3. Section 015635 – Temporary Tree and Plant Protection

1.3 DEFINITIONS

- A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.
- D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction as indicated on Drawings.
- F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 MATERIAL OWNERSHIP

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

1.6 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
1. Use sufficiently detailed photographs or video recordings.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.7 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.
- B. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises.
- C. Utility Locator Service: Engage private utility locating service before site clearing.
- D. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.
- E. Tree- and Plant-Protection Zones: Protect according to requirements in Section 015639 "Temporary Tree and Plant Protection."

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in Section 015635 - Temporary Tree and Plant Protection.

- 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 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

- A. Protect trees and plants remaining on-site according to requirements in Section 015635 - Temporary Tree and Plant Protection.
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations according to requirements in Section 015635 - Temporary Tree and Plant Protection.

3.4 EXISTING UTILITIES

- A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
 - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
 - 1. Arrange with utility companies to shut off indicated utilities.
 - 2. Owner will arrange to shut off indicated utilities when requested by Contractor.
- C. Locate, identify, and disconnect utilities indicated to be abandoned in place.
- D. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
- E. Excavate for and remove underground utilities indicated to be removed.

3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Grind down stumps and remove roots larger than 2 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.
 - 3. Use only hand methods or air spade for grubbing within protection zones.
 - 4. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth of 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
 - 1. Limit height of topsoil stockpiles to 72 inches.
 - 2. Do not stockpile topsoil within protection zones.
 - 3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
 - 4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.7 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
 - 2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. 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.
- B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for walks, pavements, turf and grasses and plants.
3. Excavating and backfilling for buildings and structures.
4. Subbase course for concrete walks and pavements.
5. Subbase course and base course for asphalt paving.
6. Subsurface drainage backfill for walls.
7. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Requirements:

1. Section 013233 – Project Reporting and Photographs.
2. Section 033000 - Cast-in-Place Concrete.
3. Section 311000 - Site Clearing and Demolition.
4. Section 312000 – Excavation, Filling and Grading.
5. Section 329200 – Turf and Grasses.
6. Section 329300 – Plants.
7. Section 329113 – Soil Preparation.

1.3 UNIT PRICES

- A. Work of this Section is affected by unit prices for earth moving specified in Section 012900 – Applications for Payment.

1.4 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
 - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized 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 lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. 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.
- I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct preexcavation conference at Project site.
 - 1. Review methods and procedures related to earthmoving, including, but not limited to, the following:
 - a. Personnel and equipment needed to make progress and avoid delays.
 - b. Coordination of Work with utility locator service.
 - c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
 - d. Extent of trenching by hand or with air spade.
 - e. Field quality control.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
 - 1. Controlled low-strength material, including design mixture.

1.7 INFORMATIONAL SUBMITTALS

- A. Retain "Material Test Reports" Paragraph below for material test reports that are Contractor's responsibility.
- B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
 - 1. Classification according to ASTM D 2487.

2. Laboratory compaction curve according to ASTM D 698.
- C. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

1.8 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

1.9 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Utility Locator Service: Notify utility locating service before beginning earth-moving operations.
- C. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified in Section 311000 - Site Clearing are in place.
- D. Do not commence earth-moving operations until plant-protection measures specified in Section 015635 - Temporary Tree and Plant Protection are in place.
- E. The following practices are prohibited within protection zones:
 1. Storage of construction materials, debris, or excavated material.
 2. Parking vehicles or equipment.
 3. Foot traffic.
 4. Erection of sheds or structures.
 5. Impoundment of water.
 6. Excavation or other digging unless otherwise indicated.
 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- F. Do not direct vehicle or equipment exhaust towards protection zones.
- G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

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: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 294/D 2940M 0; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- H. Drainage Course: Narrowly graded mixture of washed, crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve.
- I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and zero to 5 percent passing a No. 4 sieve.
- J. Sand: ASTM C 33/C 33M; fine aggregate.
- K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 CONTROLLED LOW-STRENGTH MATERIAL

- A. Controlled Low-Strength Material: Self-compacting, low-density, flowable concrete material produced from the following:
 - 1. Portland Cement: ASTM C 150/C 150M, Type I Type II or Type III.
 - 2. Fly Ash: ASTM C 618, Class C or F.
 - 3. Normal-Weight Aggregate: ASTM C 33/C 33M, 3/4-inch (19-mm) nominal maximum aggregate size.
 - 4. Foaming Agent: ASTM C 869.
 - 5. Water: ASTM C 94/C 94M.
 - 6. Air-Entraining Admixture: ASTM C 260.
- B. Produce low-density, controlled low-strength material with the following physical properties:
 - 1. As-Cast Unit Weight: 36 to 42 lb/cu. ft. at point of placement, when tested according to ASTM C 138/C 138M.
 - 2. Compressive Strength: 140 psi (965 kPa), when tested according to ASTM C 495.

2.3 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
1. Red: Electric.
 2. Yellow: Gas, oil, steam, and dangerous materials.
 3. Orange: Telephone and other communications.
 4. Blue: Water systems.
 5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth-moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
 2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. 24 inches outside of concrete forms other than at footings.

- b. 12 inches outside of concrete forms at footings.
- c. 6 inches outside of minimum required dimensions of concrete cast against grade.
- d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
- e. 6 inches beneath bottom of concrete slabs-on-grade.
- f. 6 inches beneath pipe in trenches and the greater of 24 inches wider than pipe or 42 inches wide.

3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.
- B. Excavations at Edges of Tree- and Plant-Protection Zones:
 1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 2. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following 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 unless otherwise indicated.
 1. Clearance: 12 inches on each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 1. For pipes and conduit less than 6 inches in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.

2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
 3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
 4. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- D. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- E. Trenches in Tree- and Plant-Protection Zones:
1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
 3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.8 SUBGRADE INSPECTION

- A. If Geotechnical Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- B. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Geotechnical Engineer, and replace with compacted backfill or fill as directed.
- C. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.
1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities for Record Documents.
 - 3. Testing and inspecting underground utilities.
 - 4. Removing concrete formwork.
 - 5. Removing trash and debris.
 - 6. Removing temporary shoring, bracing, and sheeting.
 - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in [Section 033000 "Cast-in-Place Concrete."]
- D. Backfill voids with satisfactory soil while removing shoring and bracing.
- E. Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- F. Place and compact final backfill with satisfactory soil to final subgrade elevation.
- G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
 2. Under walks and pavements, use satisfactory soil material.
 3. Under steps and ramps, use engineered fill.
 4. Under building slabs, use engineered fill.
 5. Under footings and foundations, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698 ASTM D 1557:
1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
 3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
 4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.16 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
1. Provide a smooth transition between adjacent existing grades and new grades.
 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
1. Turf or Unpaved Areas: Plus or minus 1 inch.
 2. Walks: Plus or minus 1 inch.

3. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.17 SUBSURFACE DRAINAGE

- A. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
 1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698 with a minimum of two passes of a plate-type vibratory compactor.
 2. Place and compact impervious fill over drainage backfill in 6-inch thick compacted layers to final subgrade.

3.18 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS.

- A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:
 1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
 2. Place base course material over subbase course under hot-mix asphalt pavement.
 3. Shape subbase course and base course to required crown elevations and cross-slope grades.
 4. Place subbase course and base course 6 inches or less in compacted thickness in a single layer.
 5. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 6. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.19 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
 2. Determine that fill material classification and maximum lift thickness comply with requirements.
 3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.
- B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

- D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- E. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab but in no case fewer than three tests.
 - 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length but no fewer than two tests.
 - 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length but no fewer than two tests.
- F. 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 materials to depth required; recompact and retest until specified compaction is obtained.

3.20 PROTECTION

- A. Protecting Graded Areas: 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 due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

SECTION 321216 - ASPHALT PAVING**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Virginia Department of Transportation, Road and Bridge Specifications, 2016.

1.2 SUMMARY

- A. Section Includes:
 - 1. Cold milling of existing asphalt pavement.
 - 2. Hot-mix asphalt paving.
- B. Related Requirements:
 - 1. Section 024116 - Structure Demolition.
 - 2. Section 024119 - Selective Demolition.
 - 3. Section 312000 - Earth Moving.
 - 4. Section 321373 - Concrete Paving Joint Sealants.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include technical data and tested physical and performance properties.
 - 2. Material certificates.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and testing agency.
- B. Material Certificates: For each paving material.
- C. Material Test Reports: For each paving material, by a qualified testing agency.
- D. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Virginia Department of Transportation, Road and Bridge Specifications, 2016, Sections 106, 309 and 315.
- B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Virginia Department of Transportation, Road and Bridge Specifications, 2016, Sections 106, 309 and 315.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
1. Tack Coat: Minimum surface temperature of 60 deg F.
 2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
 3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 - PRODUCTS**2.1 AGGREGATES**

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Coarse Aggregate: ASTM D 692/D 692M, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
- C. Fine Aggregate: ASTM D 1073 or AASHTO M 29, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.
1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.

2.2 ASPHALT MATERIALS

- A. Asphalt Binder: AASHTO M 332, PG 64-22 in accordance with Virginia Department of Transportation, Road and Bridge Specifications, 2016, Section 210.
- B. Tack Coat: ASTM D 977 or AASHTO M 140 emulsified asphalt, or ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application in accordance with Virginia Department of Transportation, Road and Bridge Standards, 2016, Section 210.
- C. Water: Potable.

2.3 AUXILIARY MATERIALS

- A. Herbicide: Commercial chemical for weed control, registered by the EPA, and not classified as "restricted use" for locations and conditions of application. Provide in granular, liquid, or wettable powder form.

2.4 MIXES

- A. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes approved by Virginia Department of Transportation, designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types"; and complying with the following requirements:
1. Virginia Department of Transportation, Road and Bridge Specifications, 2016, Section 211.

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2. Provide mixes with a history of satisfactory performance in geographical area where project is located.
3. Base Course: BM-25.0.
4. Surface Course: SM-12.5.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction.
 2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 PATCHING

- A. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Tack Coat: Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of 0.05 to 0.15 gal./sq. yd.
 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- C. Placing Patch Material: Fill excavated pavement areas with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

3.3 SURFACE PREPARATION

- A. Construction and placement including compaction and tolerances of hot-mix asphalt shall conform to the requirements of Virginia Department of Transportation, Road and Bridge Specifications, 2016, Section 315.
- B. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- C. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
 1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.

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- D. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.
1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.4 PLACING HOT-MIX ASPHALT

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
 2. Place hot-mix asphalt surface course in single lift.
 3. Spread mix at a minimum temperature of 250 deg F.
 4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
 5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Overlap mix placement about 1 to 1-1/2 inches from strip to strip to ensure proper compaction of mix along longitudinal joints.
 2. Complete a section of asphalt base course before placing asphalt surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.5 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
1. Clean contact surfaces and apply tack coat to joints.
 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
 3. Offset transverse joints, in successive courses, a minimum of 24 inches.
 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.6 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

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1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 1. Average Density: 96 percent of reference laboratory density according to ASTM D 6927 or AASHTO T 245, but not less than 94 percent or greater than 100 percent.
 2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent or greater than 96 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.7 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 1. Base Course: Plus or minus 1/2 inch.
 2. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
 1. Base Course: 1/4 inch.
 2. Surface Course: 1/8 inch.
 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.
- B. Replace and compact hot-mix asphalt where core tests were taken.
- C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.9 WASTE HANDLING

- A. General: Handle asphalt-paving waste according to approved waste management plan required in Section 017419 "Construction Waste Management and Disposal."

END OF SECTION 321216

SECTION 321313 - CONCRETE PAVING**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Walks.
- B. Related Requirements:
 - 1. Section 033000 - Cast-in-Place Concrete.
 - 2. Section 321373 - Concrete Paving Joint Sealants.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified ready-mix concrete manufacturer and testing agency.
- B. Material Test Reports: For each of the following:
 - 1. Aggregates.
- C. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

- C. Concrete Testing Service: Contractor to engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.

PART 2 - PRODUCTS

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 CONCRETE MATERIALS

- A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:
1. Portland Cement: ASTM C 150/C 150M, gray portland cement Type I.
 2. Fly Ash: ASTM C 618, Class C or Class F].
 3. Blended Hydraulic Cement: ASTM C 595/C 595M, Type IS, portland blast-furnace slag Type IP, portland-pozzolan cement.
- B. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 4M, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.
1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Air-Entraining Admixture: ASTM C 260/C 260M.
- D. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- E. Water: Potable and complying with ASTM C 94/C 94M.

2.3 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry or cotton mats.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- F. White, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B, dissipating.

2.4 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork in preformed strips.
- B. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.
- C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy-Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:
 - 1. Types I and II, nonload bearing, Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Chemical Surface Retarder: Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch.
- F. Rock Salt: Sodium chloride crystals, kiln dried, coarse gradation with 100 percent passing 3/8-inch sieve and 85 percent retained on a No. 8 sieve.

2.5 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
 - 2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that comply with or exceed requirements.
- B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash or Pozzolan: 25 percent.
 - 2. Slag Cement: 50 percent.

3. Combined Fly Ash or Pozzolan, and Slag Cement: 50 percent, with fly ash or pozzolan not exceeding 25 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 to 0.30 percent by weight of cement.
- D. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
 1. Use high-range, water-reducing and retarding admixture in concrete as required for placement and workability.
 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
- E. Concrete Mixtures: Normal-weight concrete.
 1. Compressive Strength (28 Days): 4500 psi.
 2. Slump Limit: 4 inches plus or minus 1 inch.

2.6 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M. Furnish batch certificates for each batch discharged and used in the Work.
 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 1. For concrete batches of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 2. For concrete batches larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
 2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
 3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 312000 "Earth Moving."
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Zinc-Coated Reinforcement: Use galvanized-steel wire ties to fasten zinc-coated reinforcement. Repair cut and damaged zinc coatings with zinc repair material.
- F. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M.
- G. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 - 1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
 - 2. Provide tie bars at sides of paving strips where indicated.
 - 3. Butt Joints: Use bonding agent or epoxy-bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
 5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
1. Locate expansion joints at intervals of 50 feet unless otherwise indicated.
 2. Extend joint fillers full width and depth of joint.
 3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows, to match jointing of existing adjacent concrete paving:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.
 - a. Tolerance: Ensure that grooved joints are within 3 inches either way from centers of dowels.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut **1/8-inch** wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
 - a. Tolerance: Ensure that sawed joints are within **3 inches either** way from centers of dowels.
 3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.
- B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement dowels and joint devices.
- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.
- K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.
 - 1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.

3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 - 1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.

3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture-retaining-cover curing or a combination of these as follows:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period, using cover material and waterproof tape.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.9 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
 - 1. Elevation: 3/4 inch.
 - 2. Thickness: Plus 3/8 inch, minus 1/4 inch.
 - 3. Surface: Gap below 10-feet- long; unlevelled straightedge not to exceed 1/2 inch.
 - 4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
 - 5. Lateral Alignment and Spacing of Dowels: 1 inch.
 - 6. Vertical Alignment of Dowels: 1/4 inch.
 - 7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
 - 8. Joint Spacing: 3 inches.
 - 9. Contraction Joint Depth: Plus 1/4 inch, no minus.
 - 10. Joint Width: Plus 1/8 inch, no minus.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing and inspecting of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231/C 231M, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than **500 psi**.
- D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- G. Concrete paving will be considered defective if it does not pass tests and inspections.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- I. Prepare test and inspection reports.

3.11 REPAIR AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Cold-applied joint sealants.
 - 2. Hot-applied joint sealants.
- B. Related Requirements:
 - 1. Section 321216 - Asphalt Paving.
 - 2. Section 321313 - Concrete Paving.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Paving-Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer or testing agency.
- B. Product Certificates: For each type of joint sealant and accessory.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.

1.6 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 2. When joint substrates are wet.
 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS**2.1 MATERIALS, GENERAL**

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.2 COLD-APPLIED JOINT SEALANTS

- A. Single-Component, Nonsag, Silicone Joint Sealant: ASTM D 5893/D 5893M, Type NS.
- B. Single-Component, Self-Leveling, Silicone Joint Sealant: ASTM D 5893/D 5893M, Type SL.
- C. Multicomponent, Nonsag, Urethane, Elastomeric Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use T.
- D. Single Component, Pourable, Urethane, Elastomeric Joint Sealant: ASTM C 920, Type S, Grade P, Class 25, for Use T.
- E. Multicomponent, Pourable, Urethane, Elastomeric Joint Sealant: ASTM C 920, Type M, Grade P, Class 25, for Use T.

2.3 HOT-APPLIED JOINT SEALANTS

- A. Hot-Applied, Single-Component Joint Sealant: ASTM D 6690, Type I, II, and III.

2.4 JOINT-SEALANT BACKER MATERIALS

- A. Joint-Sealant Backer Materials: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.
- B. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

- C. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.
- D. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.5 PRIMERS

- A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

- A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions.
- C. Install joint-sealant backings to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of joint-sealant backings.
 - 2. Do not stretch, twist, puncture, or tear joint-sealant backings.

3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:
1. Place joint sealants so they fully contact joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:
1. Remove excess joint sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING AND PROTECTION

- A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.
- B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

3.5 PAVING-JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Joints within concrete paving.
1. Joint Location:
 - a. Expansion and isolation joints in concrete paving.
 - b. Contraction joints in concrete paving.
 - c. Other joints as indicated.
 2. Joint Sealant: Single-component, nonsag, silicone joint sealant.
 3. Joint-Sealant Color: Manufacturer's standard.

END OF SECTION 321373

SECTION 329113 - SOIL PREPARATION**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section includes planting soils specified by composition of the mixes.
- B. Related Requirements:
 - 1. Section 129300 "Site Furnishings" for placing planting soil in exterior unit planters.
 - 2. Section 311000 "Site Clearing" for topsoil stripping and stockpiling.
 - 3. Section 329200 "Turf and Grasses" for placing planting soil for turf and grasses.
 - 4. Section 329300 "Plants" for placing planting soil for plantings.

1.3 DEFINITIONS

- A. AAPFCO: Association of American Plant Food Control Officials.
- B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.
- C. CEC: Cation exchange capacity.
- D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.
- E. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.
- F. Imported Soil: Soil that is transported to Project site for use.
- G. Layered Soil Assembly: A designed series of planting soils, layered on each other, that together produce an environment for plant growth.
- H. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.
- I. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.

- J. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."
- K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- L. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.
- M. SSSA: Soil Science Society of America.
- N. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- O. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- P. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- Q. USCC: U.S. Composting Council.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include recommendations for application and use.
 - 2. Include test data substantiating that products comply with requirements.
 - 3. Include sieve analyses for aggregate materials.
 - 4. Material Certificates: For each type of imported soil, soil amendment, and fertilizer before delivery to the site, according to the following:
 - a. Manufacturer's qualified testing agency's certified analysis of standard products.
 - b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.
 - c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.
- B. Samples: For each bulk-supplied material, 1-quart volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For each testing agency.

- B. Preconstruction Test Reports: For preconstruction soil analyses specified in "Preconstruction Testing" Article.
- C. Field quality-control reports.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction soil analyses on existing, on-site soil and imported soil.
- B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
 - 1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.9 SOIL-SAMPLING REQUIREMENTS

- A. General: Extract soil samples according to requirements in this article.
- B. Sample Collection and Labeling: Have samples taken and labeled by Contractor under the direction of the testing agency.
 - 1. Number and Location of Samples: Minimum of three representative soil samples from varied locations for each soil to be used or amended for landscaping purposes.
 - 2. Procedures and Depth of Samples: According to USDA-NRCS's "Field Book for Describing and Sampling Soils."
 - 3. Division of Samples: Split each sample into two, equal parts. Send half to the testing agency and half to Owner for its records.
 - 4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

1.10 TESTING REQUIREMENTS

- A. General: Perform tests on soil samples according to requirements in this article.
- B. Physical Testing:
 - 1. Soil Texture: Soil-particle, size-distribution analysis by one of the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":

- a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
 - b. Hydrometer Method: Report percentages of sand, silt, and clay.
2. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 3. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 4. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85% compaction according to ASTM D 698 (Standard Proctor).
- C. Chemical Testing:
1. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3-Chemical Methods."
 2. Clay Mineralogy: Analysis and estimated percentage of expandable clay minerals using CEC by ammonium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 1- Physical and Mineralogical Methods."
 3. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.
 4. Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including aluminum, arsenic, barium, cadmium, chlorides, chromium, cobalt, copper, lead, lithium, mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc.
- D. Fertility Testing: Soil-fertility analysis according to standard laboratory protocol of SSSA NAPT NEC-67, including the following:
1. Percentage of organic matter.
 2. CEC, calcium percent of CEC, and magnesium percent of CEC.
 3. Soil reaction (acidity/alkalinity pH value).
 4. Buffered acidity or alkalinity.
 5. Nitrogen ppm.
 6. Phosphorous ppm.
 7. Potassium ppm.
 8. Manganese ppm.
 9. Manganese-availability ppm.
 10. Zinc ppm.
 11. Zinc availability ppm.
 12. Copper ppm.
 13. Sodium ppm and sodium absorption ratio.
 14. Soluble-salts ppm.
 15. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
 16. Other deleterious materials, including their characteristics and content of each.
- E. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
- F. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants

indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.

1. Fertilizers and Soil Amendment Rates: State recommendations in weight per 1000 sq. ft. for 6-inch depth of soil
2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per 1000 sq. ft. for 6-inch depth of soil

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.
- B. Bulk Materials:
 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 3. Do not move or handle materials when they are wet or frozen.
 4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

PART 2 - PRODUCTS

2.1 PLANTING SOILS SPECIFIED BY COMPOSITION

- A. General: Soil amendments, fertilizers, and rates of application specified in this article are guidelines that may need revision based on testing laboratory's recommendations after preconstruction soil analyses are performed.
- B. Planting-Soil Type: Existing, on-site surface soil, with the duff layer, if any, retained and stockpiled on-site; modified to produce viable planting soil. Blend existing, on-site surface soil with the following soil amendments and fertilizers as noted in soil test results.
- C. Planting-Soil Type: Imported, naturally formed soil from off-site sources and consisting of sandy loam, loam, or loamy sand soil according to USDA textures; and modified to produce viable planting soil.
 1. Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches deep, not from agricultural land, bogs, or marshes; and that do not contain undesirable organisms; disease-causing plant pathogens; or obnoxious weeds and invasive plants including, but not limited to, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass.
 2. Additional Properties of Imported Soil before Amending: Soil reaction of pH 6 to 7 and minimum of 4 percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration.
 3. Unacceptable Properties: Clean soil of the following:

- a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
 - b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 8 percent by dry weight of the imported soil.
 - c. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 2 inches in any dimension.
4. Amended Soil Composition: Blend imported, unamended soil with the soil amendments and fertilizers as noted in soil test results.

2.2 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
1. Class: T, with a minimum of 99 percent passing through a No. 8 sieve and a minimum of 75 percent passing through a No. 60 sieve.
 2. Class: O, with a minimum of 95 percent passing through a No. 8 sieve and a minimum of 55 percent passing through a No. 60 sieve.
 3. Form: Provide lime in form of ground dolomitic limestone.
- B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Perlite: Horticultural perlite, soil amendment grade.
- E. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.
- F. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C 33/C 33M

2.3 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:
1. Feedstock: Limited to leaves
 2. Reaction: pH of 5.5 to 8
 3. Soluble-Salt Concentration: Less than 4dS/m.
 4. Moisture Content: 35 to 55percent by weight.
 5. Organic-Matter Content: minimum 30 percent of dry weight.
 6. Particle Size: Minimum of 98 percent passing through a 1-inch sieve.
- B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture with 100 percent passing through a 1/2-inch sieve, a pH of 3.4 to 4.8, and a soluble-salt content measured by electrical conductivity of maximum 5 dS/m.

- C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture with 100 percent passing through a 1/2-inch sieve, a pH of 6 to 7.5, a soluble-salt content measured by electrical conductivity of maximum 5dS/m, having a water-absorbing capacity of 1100 to 2000 percent, and containing no sand.
- D. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

2.4 FERTILIZERS

- A. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20percent available phosphoric acid.
- B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.
- C. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.
- D. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

PART 3 - EXECUTION

3.1 GENERAL

- A. Place planting soil and fertilizers according to requirements in other Specification Sections.
- B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.
- C. Proceed with placement only after unsatisfactory conditions have been corrected.

3.2 PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

- A. Excavation: Excavate soil from designated area(s) to a depth of 6 inches and stockpile until amended.

- B. Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
- C. Unsuitable Materials: Clean soil to contain a maximum of 8 percent by dry weight of stones, roots, plants, sod, clay lumps, and pockets of coarse sand.
- D. Screening: Pass unamended soil through a 2-inch sieve to remove large materials.

3.3 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

- A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Subgrade Preparation: Till subgrade to a minimum depth of 12 inches. Remove stones larger than 2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1. Apply, add soil amendments, and mix approximately half the thickness of unamended soil over prepared, loosened subgrade according to "Mixing" Paragraph below. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.
- C. Mixing: Spread unamended soil to total depth of 6 inches, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
 - 1. Amendments: Apply soil amendments, except compost, and fertilizer, if required, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.
 - a. Mix lime and sulfur with dry soil before mixing fertilizer.
 - b. Mix fertilizer with planting soil no more than seven days before planting.
 - 2. Lifts: Apply and mix unamended soil and amendments in lifts not exceeding 8 inches in loose depth for material compacted by compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- D. Compaction: Compact each blended lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698 and tested in-place.
- E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 APPLYING COMPOST TO SURFACE OF PLANTING SOIL

- A. Application: Apply 4 inches of compost to surface of in-place planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Finish Grading: Grade surface to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections:
 - 1. Compaction: Test planting-soil compaction after placing each lift and at completion using a densitometer or soil-compaction meter calibrated to a reference test value based on laboratory testing according to ASTM D 698. Space tests at no less than one for each 2000 sq. ft. of in-place soil or part thereof.
- C. Soil will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.

3.6 PROTECTION

- A. Protection Zone: Identify protection zones according to Section 015639 "Temporary Tree and Plant Protection."
- B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Vehicle traffic.
 - 4. Foot traffic.
 - 5. Erection of sheds or structures.
 - 6. Impoundment of water.
 - 7. Excavation or other digging unless otherwise indicated.
- C. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Architect and replace contaminated planting soil with new planting soil.

3.7 CLEANING

- A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.
 - 1. Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.

END OF SECTION 329113

SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Seeding.
 - 2. Hydroseeding.
 - 3. Meadow grasses and wildflowers.
 - 4. Turf renovation.

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation" and drawing designations for planting soils.
- E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- F. Weeds: Plants not initially included in intended planting seed mixes. At a minimum, the following are of specific concern and require removal:
 - 1. Bindweed
 - 2. Blackberry
 - 3. Multi-flora Rose
 - 4. Mile-a-minute
 - 5. Japanese Hops
 - 6. Autumn Olive
 - 7. Canada Thistle
 - 8. Mugwort

9. Noxious Weeds identified in the VA Department of Agriculture Noxious Weed Law Tiers 1, 2 , and 3

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For landscape Installer.
- B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
- C. Product Certificates: For fertilizers, from manufacturer.
- D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.
- E. E: Soil Reports: For a minimum of three distinct turf areas indicating the chemical composition and soil test laboratory recommendations for fertilizers and amendments.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf and meadows during a calendar year. Submit before expiration of required maintenance periods.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf and meadow establishment.
 1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
 2. Experience: Five years' experience in turf installation in addition to requirements in Section 014000 "Quality Requirements."
 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:
 - a. Landscape Industry Certified Technician - Exterior.
 - b. Landscape Industry Certified Lawncare Manager.
 - c. Landscape Industry Certified Lawncare Technician.
 5. Pesticide Applicator: State licensed, commercial.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.
- B. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - 3. Accompany each delivery of bulk materials with appropriate certificates.

1.9 FIELD CONDITIONS

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting completion.
 - 1. Seed
 - a. Spring: March 01 to May 15
 - b. Fall: August 15 to October 15
 - 2. Meadow
 - a. Spring: February 01 to April 15
 - b. Fall: October 01 through December 31
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances. It shall be mixed in the proportion shown and test results certifying 98% minimum purity, with no more than .01% weed seed (must be free of ryegrass, timothy, orchardgrass, bentgrass, Canada bluegrass, clover, or any other contaminant which will be unsightly or hard to control), no more than .01% other crops (must be free of dock, chess, chickweed, crabgrass, plantain, and black medic), free of noxious weed seed, and 85% minimum germination. Approved varieties shall be selected from "Recommended Turfgrass cultivars for Professional Seed Mixtures," University of Maryland Turfgrass Technical Update TT-77, most recent edition. A copy of this publication can be obtained by visiting the Maryland Turfgrass Council website <http://www.mdturfcouncil.org> or by calling them at 410-836-2876.
- B. Seed Species:
 - 1. Quality: State-certified seed of grass species as listed below for solar exposure.

2. Quality: Seed of grass species as listed below for solar exposure, with not less than 85 percent germination, not less than 95 percent pure seed, and not more than 0.5 percent weed seed:
3. Sun and Partial Shade: Proportioned by weight as follows:

- a. 80-95% Certified Tall Fescue
- b. 5-10% Certified Kentucky Bluegrass
- c. 0-10% Certified Perennial Ryegrass*

- C. All seed and labeling must fully comply with the Code of Virginia and these specifications.
- D. All seed must be state certified and blended in accordance with the Virginia Handbook of Seed Certification Standards.
- E. All seed and labeling must fully comply with the Code of Virginia and Seeds Section.
- F. Each bag shall contain proper label and certification tag.

2.2 MEADOW GRASSES AND WILDFLOWERS

- A. Wildflower and Native-Grass Seed: Fresh, clean, and dry new seed, of mixed species as noted in drawings.
- B. Seed Carrier: Inert material, sharp clean sand or perlite.

2.3 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 1. Composition for bidding purposes: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
 2. Composition for installation: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 1. Composition for bidding purposes: 0 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
 2. Composition for installation purposes: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.4 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Sphagnum Peat Mulch: Partially decomposed sphagnum peat moss, finely divided or of granular texture, and with a pH range of 3.4 to 4.8.

- C. Muck Peat Mulch: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent, and containing no sand.
 - D. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of less than 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 - 1. Organic Matter Content: 50 to 60 percent of dry weight.
 - 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
 - E. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.
 - F. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.
 - G. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.
- 2.5 PESTICIDES
- A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
 - B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
 - C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 3. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

- A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - 1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
 - 2. Protect grade stakes set by others until directed to remove them.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

- A. General: Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation." Coordinate "Placing Planting Soil" Paragraph below with Section 329113 "Soil Preparation" or Section 329115 "Soil Preparation (Performance Specification)."
- B. Placing Planting Soil: Place and mix planting soil in place over exposed subgrade.
- C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- D. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 MEADOW AREA PREPARATION

- A. Remove existing vegetation by tilling, smothering with black plastic or application of approved herbicides.
 - 1. If herbicides are used, wait an appropriate interval for the herbicide product residue to not pose a impediment to meadow germination
- B. Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation." Coordinate "Placing Planting Soil" Paragraph below with Section 329113 "Soil Preparation".
- C. Placing Planting Soil: Place and mix planting soil in place over exposed subgrade.
- D. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- E. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.5 PREPARATION FOR EROSION-CONTROL MATERIALS

- A. Prepare area as specified in "Turf Area Preparation" Article.

- B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.
- C. Fill cells of erosion-control mat with planting soil and compact before planting.
- D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.
- E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.6 SEEDING

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.
 - 1. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 - 2. Do not use wet seed or seed that is moldy or otherwise damaged.
 - 3. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
- B. Sow seed at a total rate of [7 to 8 lb/1000 sq. ft.
- C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- D. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets installed and stapled according to manufacturer's written instructions.
- E. Protect seeded areas with erosion-control mats where indicated on Drawings; install and anchor according to manufacturer's written instructions.
- F. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
 - 1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
 - 2. Bond straw mulch by spraying with asphalt emulsion at a rate of 10 to 13 gal./1000 sq. ft. Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.
- G. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

3.7 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, commercial fertilizer and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
 - 1. Mix slurry with fiber-mulch manufacturer's recommended tackifier.

2. Spray-apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.
3. Spray-apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than 500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate. Apply slurry cover coat of fiber mulch (hydromulching) at a rate of 1000 lb/acre.

3.8 TURF MAINTENANCE

- A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
 1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches
 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
- C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
 1. Mow Fescue/Kentucky Bluegrass to a height of 2 to 3 inches.
- D. Turf Postfertilization: Apply slow-release fertilizer after initial mowing and when grass is dry.
 1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.9 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Architect:
 1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches

2. Satisfactory Plugged Turf: At end of maintenance period, the required number of plugs has been established as well-rooted, viable patches of grass, and areas between plugs are free of weeds and other undesirable vegetation.
 3. Satisfactory Sprigged Turf: At end of maintenance period, the required number of sprigs has been established as well-rooted, viable plants, and areas between sprigs are free of weeds and other undesirable vegetation.
- B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.10 MEADOW

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.
1. Before sowing, mix seed with seed carrier at a ratio of not less than **three** parts seed carrier to one-part seed.
 2. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 3. Do not use wet seed or seed that is moldy or otherwise damaged.
- B. Sow seed at a total rate as indicated by manufacturer.
- C. Brush seed into top 1/16 inch of soil, roll lightly, and water with fine spray.
- D. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.
- E. Water newly planted areas and keep moist until meadow is established.

3.11 MEADOW MAINTENANCE

- A. Maintain and establish meadow by watering, weeding, mowing, trimming, replanting, watering, and performing other operations as required to establish a healthy, viable meadow. Roll, regrade, and replant bare or eroded areas and remulch. Provide materials and installation the same as those used in the original installation.
1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and meadow damaged or lost in areas of subsidence.
 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 3. Apply treatments as required to keep meadow and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: Install and maintain temporary piping, hoses, and meadow-watering equipment to convey water from sources and to keep meadow uniformly moist.
1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.

2. Water meadow with fine spray at a minimum rate of 1/2 inch per week for eight weeks after planting unless rainfall precipitation is adequate.
- C. First Growing Season
1. Trim the meadow to 18" with a bush hog mower or sting trimmer to a height of 8 inches. Lawn mowers are not acceptable tools to use. Cease trimming by mid-September
 2. Hand pull weeds or spot apply herbicides to areas that weeds exceed 5% of any 100sf area.
 3. For heavy weed infestation areas exceeding 10% of any 100 sf area, re-prepare areas in accordance with meadow preparation and reseed with meadow seed mix.
- D. Second Growing Season
1. Prior to Spring new growth reaching a height of two inches (timed to Forsythia and American Redbuds blooming) trim the previous years vegetation to two inches.
 2. Hand pull weeds or spot apply herbicides to areas that weeds exceed 5% of any 100sf area.
 1. Trim the meadow to 18" with a bush hog mower or sting trimmer to a height of 8 inches. Lawn mowers are not acceptable tools to use. Cease trimming by mid-September

3.12 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace turf, meadow, and accessories that fail in materials, workmanship, or growth within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
 - b. Faulty performance of edgings and weed establishment exceeding 10% of any 10 sf of turf or meadow.
 2. Warranty Periods: From date of planting completion.
 - a. Turf : Three months or until satisfactory turf is established, whichever is greater.
 - b. Meadow: Twelve months.
 3. Include the following remedial actions as a minimum:
 - a. Repair in accordance with turf and meadow maintenance sections.
 - b. Provide extended warranty for period equal to original warranty period, for repaired unsatisfactory turf and meadow areas.

3.13 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.14 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.
- C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
- D. Remove nondegradable erosion-control measures after grass establishment period.

3.15 MAINTENANCE SERVICE

- A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Turf Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:
 - 1. Seeded Turf: From date of installation to end of warranty period.
 - a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.
- B. Meadow Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Meadow Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable meadow is established, but for not less than maintenance period below.
 - 1. Maintenance Period: From date of installation to end of warranty period.

END OF SECTION 329200

SECTION 329300 - PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Plants.
 - 2. Tree stabilization.
 - 3. Tree-watering devices.
- B. Related Requirements:
 - 1. Section 015639 "Temporary Tree and Plant Protection" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.
 - 2. Section 329200 "Turf and Grasses" for turf (lawn) and meadow planting, and hydroseeding.

1.3 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required.
- D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than the minimum root spread according to ANSI Z60.1 for type and size of plant required.
- E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

- F. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.
- G. Finish Grade: Elevation of finished surface of planting soil.
- H. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.
- I. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- J. Planting Area: Areas to be planted.
- K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation" for drawing designations for planting soils.
- L. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- M. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- N. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
- O. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 COORDINATION

- A. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
 - 1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.

2. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.
- B. Samples for Verification: For each of the following:
1. Trees and Shrubs: Three > Samples of each variety and size delivered to site for review. Maintain approved Samples on-site as a standard for comparison.
 2. Organic Mulch: 1-pint > volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
 3. Slow-Release, Tree-Watering Device: One unit of each size required.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
- B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
1. Manufacturer's certified analysis of standard products.
 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- C. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.
- D. Sample Warranty: For special warranty.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.
1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
 2. Experience: Five years' experience in landscape installation in addition to requirements in Section 014000 "Quality Requirements."

3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:
 - a. Landscape Industry Certified Technician - Exterior.
 - b. Landscape Industry Certified Interior.
 - c. Landscape Industry Certified Horticultural Technician.
 5. Pesticide Applicator: State licensed, commercial.
- B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
1. Selection of plants purchased under allowances is made by Architect, who tags plants at their place of growth before they are prepared for transplanting.
- C. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
 2. Other Plants: Measure with stems, petioles, and foliage in their normal position.
- D. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Architect may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
1. Notify Architect of sources of planting materials seven days in advance of delivery to site.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.
- B. Bulk Materials:
1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 3. Accompany each delivery of bulk materials with appropriate certificates.
- C. Deliver bare-root stock plants within 24 hours of digging. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

Transport in covered, temperature-controlled vehicles, and keep plants cool and protected from sun and wind at all times.

- D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- E. Handle planting stock by root ball.
- F. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.
- G. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.
- H. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
 - 1. Heel-in bare-root stock. Soak roots that are in less than moist condition in water for two hours. Reject plants with dry roots.
 - 2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
 - 3. Do not remove container-grown stock from containers before time of planting.
 - 4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

1.11 FIELD CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
 - 1. September 1 to June 15, whenever soil is not frozen or excessively wet.
- C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1.12 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
 - 1. Failures include, but are not limited to, the following:

- a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
 - b. Structural failures including plantings falling or blowing over.
 - c. Faulty performance of tree stabilization.
 - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
2. Warranty Periods: From date of planting completion.
- a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months or completion of a single complete growing season, whichever is greater.
 - b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months or completion of a single complete growing season, whichever is greater.
 - c.
3. Include the following remedial actions as a minimum:
- a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
 - b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.
 - d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable.
 2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
- B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.
- C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- D. Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.

- E. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

2.2 FERTILIZERS

- A. Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.
 - 1.
 - 2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

2.3 MULCHES

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
 - 1. Type: Shredded hardwood.
 - 2. Size Range: 3 inches maximum, 1/2 inch minimum
 - 3. Color: Natural.
- B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through a 1-inch sieve; soluble-salt content of 2 to 5dS/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 - 1. Organic Matter Content: 50 to 60percent of dry weight.
 - 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

2.4 PESTICIDES

- A. General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.5 TREE-STABILIZATION MATERIALS

- A. Trunk-Stabilization Materials:

1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.
2. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
3. Guy Cables: Five-strand, 3/16-inch-diameter, galvanized-steel cable, with zinc-coated turnbuckles, a minimum of 3 inches long, with two 3/8-inch galvanized eyebolts.
4. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.

2.6 TREE-WATERING DEVICES

- A. Slow-Release Watering Device: Standard product manufactured for drip irrigation of plants and emptying its water contents over an extended time period manufactured from UV-light-stabilized nylon-reinforced polyethylene sheet, PVC, or HDPE plastic.

2.7 MISCELLANEOUS PRODUCTS

- A. Burlap: Non-synthetic, biodegradable.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.
 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 2. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
 3. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 4. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.
- D. Lay out plants at locations directed by Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

3.3 PLANTING AREA ESTABLISHMENT

- A. General: Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation."
- B. Placing Planting Soil: Place and mix planting soil in-place over exposed subgrade.
- C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits and Trenches: Excavate circular planting pits.
 - 1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
 - 2. Excavate approximately three times as wide as ball diameter.
 - 3. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
 - 4. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
 - 5. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
 - 6. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
 - 7. Maintain supervision of excavations during working hours.
 - 8. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
 - 9. If drain tile is indicated on Drawings or required under planting areas, excavate to top of porous backfill over tile.
- B. Backfill Soil: Subsoil and topsoil removed from excavations maybe used as backfill soil unless otherwise indicated.
- C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
- D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.
- E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE, SHRUB, AND VINE PLANTING

- A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.
- B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch > adjacent finish grades.
 - 1. Backfill: Planting soil For trees, use excavated soil for backfill.
 - 2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
 - 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 - 4. Continue backfilling process. Water again after placing and tamping final layer of soil.
- D. Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 1-inch adjacent finish grades.
 - 1. Backfill: Planting soil For trees, use excavated soil for backfill.
 - 2. Carefully remove root ball from container without damaging root ball or plant.
 - 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 - 4. Continue backfilling process. Water again after placing and tamping final layer of soil.
- E. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.6 MECHANIZED TREE-SPADE PLANTING

- A. Trees may be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-grown, balled-and-burlapped root-ball diameter according to ANSI Z60.1, or larger than manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.
- B. Use the same tree spade to excavate the planting hole as will be used to extract and transport the tree.
- C. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.
- D. Cut exposed roots cleanly during transplanting operations.

- E. Plant trees following procedures in "Tree, Shrub, and Vine Planting" Article.
- F. Where possible, orient the tree in the same direction as in its original location.

3.7 TREE, SHRUB, AND VINE PRUNING

- A. Remove only dead, dying, or broken branches. Do not prune for shape.
- B. Prune, thin, and shape trees, shrubs, and vines as directed by Architect.
- C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- D. Do not apply pruning paint to wounds.

3.8 TREE STABILIZATION

- A. Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless otherwise indicated:
 - 1. Upright Staking and Tying: Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend one-third of trunk height above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
 - 2. Upright Staking and Tying: Stake trees with two stakes for trees up to 12 feet high and 2-1/2 inches or less in caliper; three stakes for trees less than 14 feet (4.2 m) high and up to 4 inches in caliper. Space stakes equally around trees.
 - 3. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
 - 4. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
- B. Trunk Stabilization by Staking and Guying: Install trunk stabilization as follows unless otherwise indicated on Drawings. Stake and guy trees more than 14 feet in height and more than 3 inches in caliper unless otherwise indicated.
 - 1. Site-Fabricated, Staking-and-Guying Method: Install no fewer than three guys spaced equally around tree.
 - a. Securely attach guys to stakes 30 inches long, driven to grade. Adjust spacing to avoid penetrating root balls or root masses. Provide turnbuckle for each guy wire and tighten securely.
 - b. For trees more than 6 inches, anchor guys to deadmen buried at least 36 inches below grade. Provide turnbuckle for each guy wire and tighten securely.
 - c. Support trees with bands of flexible ties at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
 - d. Support trees with guy cable, connected to the brass grommets of tree-tie webbing at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.

- e. Attach flags to each guy wire, 30 inches above finish grade.
 - f. Paint turnbuckles] with luminescent white paint.
2. Proprietary Staking and Guying Device: Install staking and guying system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

3.9 GROUND COVER AND PLANT PLANTING

- A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated on Drawings in even rows with triangular spacing.
- B. Use planting soil for backfill.
- C. Dig holes large enough to allow spreading of roots.
- D. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to a depth not less than two nodes.
- E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.10 PLANTING AREA MULCHING

- A. Mulch backfilled surfaces of planting areas and other areas indicated.
 - 1. Trees and Treelike Shrubs in Turf Areas: Apply organic mulch ring of 3-inch average thickness, with 36-inch radius around trunks or stems. Do not place mulch within 3 inches of trunks or stems.
 - 2. Organic Mulch in Planting Areas: Apply 3-inch average thickness of organic mulch extending 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

3.11 INSTALLING SLOW-RELEASE WATERING DEVICE

- A. Provide one device for each tree.
- B. Place device on top of the mulch at base of tree stem and fill with water according to manufacturer's written instructions.

3.12 PLANT MAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.

- B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.13 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Do not apply to seeded areas.
- C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.14 REPAIR AND REPLACEMENT

- A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Architect.
 - 1. Submit details of proposed pruning and repairs.
 - 2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
 - 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.
- B. Remove and replace trees that are more than 25percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.

3.15 CLEANING AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.
- C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- D. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

- E. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

3.16 MAINTENANCE SERVICE

- A. Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:
 - 1. Maintenance Period: From date of installation to end of warranty period
- B. Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:
 - 1. Maintenance Period: From date of installation to end of warranty period.

END OF SECTION 329300