ARLINGTON
VIRGINIA

Office of the Purchasing Agent
2100 Clarendon Blvd., Suite 500
Arlington, VA 22201

Project Manual

Department of Parks and Recreation

11th Street Park Improvements
(By Right)

23-CPHD-ITBPW-379

DIVISION 01

SUMMARY AND

GENERAL REQUIREMENTS

SECTION 011000 – GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Work covered by the Contract Documents.
2. Use of premises.
3. General requirements.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: 11th and Danville Park Improvements

B. Project Location: 2751 11th Street North, Arlington, Virginia

C. Owner: Arlington County, Virginia
Department of Parks and Recreation
2100 Clarendon Boulevard, Suite 414
Arlington, VA 22201

The Work consists of, but is not limited to, the following:

1. Demolition, site work, walkways, signage, electrical, site furnishings and landscaping; the construction of site improvements as shown on the Plans and specified hereinafter, including:

    a. Site preparation including construction fences, tree protection fencing, temporary erosion and sediment control measures, and construction stake-out.

    b. Protection and maintaining and all other existing park property, Arlington County right-of-way, and other existing improvements as required.

    c. Site restoration of all facilities damaged by construction operations, or as directed by Department of Parks and Recreation (DPR), to the original condition and/or the satisfaction of DPR. Site restoration includes, but is not limited to, pavement restoration, site grading, topsoil, seeding and sodding.

2. Site Improvements:

    a. Construction of concrete walks, concrete curbs, and aggregate base as shown on the Plans and Specifications.
    b. Supply and install site furnishings and structures such as trash and recycling receptacles, benches, tables/ chairs, and signage as shown on the Plans and Specifications.
    c. Plantings as shown on the Plans and Specifications.

D. Project will be constructed under a single prime contract.

1.3 USE OF PREMISES

A. General: Contractor shall have limited use of premises for construction operations as indicated in the Specifications and on the Drawings by the Contract limits.

B. Any existing water fountain or other site water sources shall not be used as supply for construction water.

C. Use of Site: Do not disturb portions of Project site beyond areas in which the Limit of Disturbance (LOD) is shown. Specific limitations on use of the site include the following:

1. Construction activity shall not take place inside designated tree protection areas, except when necessary and as approved by Project Officer. Contractor shall provide Project Officer with 72 hours' notice when work within a tree protection area is necessary, so that the County's urban forester can be notified.
2. Maintain public access to areas outside the limits of work whenever possible. Contractor shall request approval from Project Officer 72 hours in advance when closures outside the limits of work are necessary.

1.4 GENERAL REQUIREMENTS

A. Coordination: The Contractor shall be responsible for coordinating all construction operations included in the various Sections of the Specifications to ensure efficient and orderly installation of each part of the work.

B. Contact Person: The Contractor shall establish a single contact person that will be responsible for all communication between the Contractor (including all subcontractors) and the Project Officer, Landscape Architect, and/or Engineer.

C. Submittals: Upon Contract award, the Contractor shall immediately prepare a list of required submittals, based on the specifications, and begin to gather the required submittals for submission to the Project Officer within 20 days for critical (long-lead items) submittals and 30 days for others.

D. Site Access: *(describe point of access or entry, include any requirements, conditions or limitations if applicable. Otherwise delete).*

E. Permits: *(*

1. The County shall provide the following permits if applicable:
   a. Virginia Stormwater Management Permit (VSMP)
   b. Land Disturbance Activity (LDA) . After award of contract, the contractor shall transfer the LDA permit to the contractor's name and notify the Project Officer.
2. The Contractor is responsible for obtaining all other required permits from the Arlington County Department of Environmental Services (DES) and/or Inspection Services Division (ISD). The permits shall include but not limited to Right of Way, electrical, plumbing,

mechanical, Energy Assessment, Certificate of Occupancy, Dumpster permit, Trailer permit and/or any other work necessary for the completion of the project.

3. The Contractor is required to submit designs, shop drawings, structural calculations, engineer certifications, or other items required for permit approval. In that case, the Contractor shall build in the required time for obtaining, submitting, and gaining approval of these items into the construction schedule.

F. Subcontractors:

1. A list of proposed subcontractors shall be submitted to the Project Officer. Proposed subcontractors shall be subject to the review and approval of the Project Officer, who will respond to the proposed list of subcontractors within ten (10) working days of receipt. Reasons for rejection of a proposed subcontractor may include, but are not limited to, the following:
   a. Unsatisfactory work on previous County contracts.

   b. Lack of experience in the type of work to be subcontracted.

2. The Contractor is fully responsible for the work of its subcontractors, and any unsatisfactory work on the part of a subcontractor shall be remedied at the Contractor's expense if necessary.

3. A competent person from the Prime Contractor shall be present on the site during the work of all subcontractors. If such a person is not present while a subcontractor is working on the site, the Project Officer reserves the right to stop work. No Claims for Delay will be allowed as a result of such stoppages.

4. All subcontractors must be furnished with a full set of the contract drawings and specifications at the Contractor's expense, and subcontractors shall be required to have these documents on site while the work is being performed. If the subcontractor does not have access to a full set of plans and specifications while working on the site, the Project Officer reserves the right to stop work. No Claims for Delay will be allowed as a result of such stoppages.

G. Construction Schedule:

1. The construction schedule shall indicate the dates and date ranges where major components of the Work will be performed.
2. The schedule shall indicate the dates that required submittals will be provided and shall also indicate time allotted for the review and approval of submittals.
3. The Contractor shall maintain and update the schedule when conditions change and shall resubmit the updated schedule on a monthly basis to the Project Officer.
4. The Contract completion date cannot be changed by submission of a construction schedule indicating a different completion date. The Contract completion date can only be changed if specifically authorized by Change Order.

H. Preconstruction Meeting:

1. The Contractor shall attend a preconstruction meeting on-site with the Project Officer, Landscape Architect, their Consultants, the Contractor, major subcontractors, major suppliers, and other concerned parties.

2. At the meeting, the Contractor shall provide the following:

    a. Construction schedule
    b. List of required submittals
    c. List of proposed subcontractors

3. Items of significance that could affect the progress of the work shall be discussed at the meeting.
4. Requirements for tree protection and erosion control shall be reviewed.
5. The Contractor shall record and distribute meeting minutes.

I. Notice to Proceed:

1. After the preconstruction meeting, the Project Officer will issue a written Notice to Proceed (NTP) to the Contractor.
2. The work commencement date shall be (7) calendar days from the date of issuance of Notice to Proceed.
3. The commencement date shall be the first day of the contract.
4. Generally, the NTP date is agreed-upon between the Project Officer and the Contractor. However, in the event of non-responsiveness or delay on the part of the Contractor, the Project Officer reserves the right to issue a NTP unilaterally without the agreement of the Contractor.

J. Contract Deliverables:

1. Construction Schedule
2. List of required submittals
3. List of proposed sub-contractors
4. Submittals - 30 days for critical (long-lead items) and 45 days for others from date of issuance of Purchase Order.
5. Safety Plan prior to NTP date.
6. SWPPP book prior to NTP date. SWPPP shall be approved by DES prior to construction start.
7. Existing Conditions Photograph.

K. Progress Meetings:

1. The Contractor shall attend construction progress meetings on a bi-weekly basis, and at the request of the Project Officer.
2. A two week look ahead schedule shall be submitted at each progress meeting.
3. At the meeting, the following issues shall be discussed:

    a. Work completed to date.
    b. Work remaining to be completed and anticipated timeframes.
    c. Issues affecting the progress of the work.
    d. Items that require correction.

4. The Contractor shall record and distribute meeting minutes.

L. Requests for Information (RFI):

1. The Contractor shall submit a written RFI in any of the following instances (not all-inclusive):

    a. If the intent of any item in the drawings and specifications is unclear.
    b. If existing conditions differ from those indicated on the drawings.
    c. To document any verbal agreements or instructions.

2. In instances (a) and (b), the Contractor shall stop work in the affected area, notify the Project Officer, and await instructions.
3. The Contractor shall be responsible for any expenses incurred due to unexpected conditions if he fails to notify the Project Officer and wait for direction prior to continuing work in the affected area.
4. The Contractor's failure to properly document any verbal agreements or instructions will result in the rejection of any claim for changes to the Contract amount or additional time for completion.
5. The Contractor is responsible for making the necessary inquiries to determine the design intent of the drawings and specifications if anything is unclear, prior to submitting a bid. Claims for changes to the contract amount submitted after Contract award due to an RFI response may be approved or rejected at the sole discretion of the Project Officer.

M. Documentation of Events: The Contractor shall document and immediately report any of the following events to the Project Officer:

1. Accidents.
2. Stoppages, delays, shortages, and losses.
3. Orders and requests of authorities having jurisdiction.
4. Services connected and disconnected.
5. Existing conditions that significantly differ from those indicated on the drawings.

N. Documentation of Work Activity: The Contractor shall document and submit on a daily basis a daily report. The daily report shall contain the following information:

1. Contractor name.
2. Date and time.
3. Temperature and weather condition.
4. Project number.
5. Contract number.
6. List of sub-contractors on site by trade.
7. List of number of man-hours for contractor and subcontractor.
8. Description of each activity performed by the contractor and sub-contractor(s).
9. List of materials stored on site and delivered.
10. List of equipment materials stored on site and delivered.
11. Submit all tickets for verification for the following, but not limited to materials and equipment delivered, concrete pours and soil removal.

O. If the project site will not be worked on a particular workday or days, the Contractor shall notify the Project Officer that the site will not be worked on and shall state the reason for such.

P. Claims for Delay:

1. The Contractor shall submit a written Claim for Delay within ten (10) working days of any event where the Contractor believes that an extension to the Contract time for completion is necessary or justified.
2. The written Claim for Delay must include the following information:

    a. Amount of days claimed
    b. Justification for the delay
    c. Supporting documentation

3. Justifications for Claims for Delay include the following:

    a. Inclement weather that prevents work on the site
    b. Events beyond the control of the Contractor that result in a delay to the project, with the following exceptions:

        1) Delays in the delivery of materials.
        2) Failure of suppliers to provide required submittals in a timely manner.
        3) Any delays that result from the actions of a subcontractor.
        4) Disputes between the Contractor and subcontractors or suppliers
        5) Rejection of submittals.
        6) Re-work resulting from unsatisfactory work.
        7) Re-work resulting from failure to provide required submittals.
        8) Re-work resulting from failure to submit a Request for Information (RFI) if the design intent is unclear.
        9) Failure to obtain required permits in a timely fashion, as stated in Section above 1.4.E, Permits.
        10) Failure to request required inspections from the Inspection Services Division (ISD) in a timely fashion, or rejection of work by an inspector.
        11) Stop work orders issued by authorities having jurisdiction that are due to items that are the Contractor's responsibility.

4. A Claim for Delay may be denied if the Contractor fails to continue work on other aspects of the project that are not affected by the particular delayed item, or if, in the Project Officer's determination, the Contractor has failed to continuously work on the project or effectively manage the project.

5. If planting installation is not feasible because it is not the proper season for planting, the Contractor shall notify the Project Officer. The Project Officer, at his sole discretion, may decide to treat planting as a Punch List item, thereby exempting it as a requirement for a Determination of Substantial Completion.

Q. Liquidated Damages (Damages for Delay): The Project Officer does NOT have the authority to waive Liquidated Damages unless the supporting documentation described above has been provided by the Contractor (within the aforementioned time limit) and approved by the Project Officer.

R. Existing Conditions: Dimensions and/or locations of existing facilities and/or underground utilities shown on the plans are approximate. The contractor shall verify exact locations before commencing work.

S. Code Compliance: Comply with all applicable codes and regulations of authorities having jurisdiction.

T. Safety: Take all precautions necessary to protect the public during the construction period.

U. Protection of Existing Conditions: Take all precautions necessary to protect existing facilities to remain during the construction period. Repair any and all damage to existing facilities to remain caused by construction operations. Maintain existing utilities and protect them against damage during construction. Contact Miss Utility at (800) 552-7001 for utility locations prior to any excavation.

V. County Rights-of-Way: Work taking place within the right-of-way of County streets shall conform to the Arlington County DES Construction Standards and Specifications. The Contractor shall obtain a right-of-way permit from the County for work to take place within street rights-of-way.

W. Differing or Conflicting Requirements: If a Specification section requires compliance with two or more standards, or if requirements conflict, the more stringent standard or requirement shall apply.

X. Quality Control Testing and Laboratory Services: The Contractor shall provide necessary labor and supervision required to support field testing and inspection by the Project Officer. Defects disclosed by tests shall be rectified at no additional cost to the County.

Y. Record "As-Built" Drawings: The Contractor shall submit three (3) sets of marked-up plans at the end of the construction period indicating any and all conditions that differ from the original Contract drawings. The As-built drawings shall be signed and stamped by a Professional Engineer or Licensed Land Surveyor. The As-built drawings shall comply with Arlington County Minimum Acceptance Criteria (MAC) Checklist (see attached).

Z. Operation and Maintenance Manuals: Contractor shall provide operations and maintenance manuals for all applicable products and systems used in the Work prior to substantial completion inspection.

END OF SECTION 011000

SECTION 012000 - MOBILIZATION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Mobilization shall include the following items:

1. Furnish and set up Contractor's necessary general plant and equipment required for operations on to the site, including construction fence, storage areas, office, and such sanitary and other facilities as are required by County, State, or Federal law or regulation. The determination of adequacy of the Contractor's facilities, except as noted above, shall be made by the Contractor.
2. Providing on-site all OSHA required notices and establishment of safety programs.
3. Obtaining all required permits for completion of the project.
4. Having the Contractor's superintendent at the jobsite full time.
5. The cost of required insurance and bonds and/or any other similar significant initial expense required for the initiation of the contract work shall be included in this item.
6. Submitting initial submittals and submittal log.
7. Provide approved SWPPP book.
8. The cost for mobilization shall not exceed 3% of the total contract bid price (all items listed on the Pricing Sheet) excluding the bid for mobilization.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.01 Such work as is done in providing the facilities and services under this item shall be done in safe and workmanlike manner and shall conform to any pertinent County, State or Federal law, regula- tion, or code. Good housekeeping consistent with safety shall be maintained.

END OF SECTION 012000

SECTION 013300-SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.02 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Landscape Architect or Project Officer's responsive action.

B. Informational Submittals: Written information that does not require Landscape Architect or Project Officer's responsive action. Submittals may be rejected for not complying with requirements.

1.03 GENERAL REQUIREMENTS

A. Upon Contract Award, the Contractor shall prepare a list of required submittals, and shall immediately begin working to compile all required submittals.

B. The Contractor shall not begin work which requires the submission of other data, until said submittals are returned with the Project Officer’s stamp indicating approval or “approved as noted.”

C. Deviations from Contract Documents: Approval of submittals does not relieve Contractor from responsibility for full compliance with the Contract Documents. Approval of a submittal does not indicate acceptance of any deviations from the Contract Documents included in the submittal. Such deviations must be approved specifically in writing by the Project Officer.

1.04 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

B. Project Officer: All submittals shall be submitted to the Project Officer, who will then distribute submittals to the Landscape Architect, as applicable. Landscape Architect shall return submittals with action taken to the Project Officer who will then notify the Contractor.

C. Submittals Schedule: Include a list of submittals for review in the construction schedule.

D. Submittals Log: Contractor shall submit a log of all items prior to commencing work. Nomenclature shall include submittal number, item number, description and any other information that may be necessary.

E. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Project Officer's receipt of submittal. No extension of the Contract Time will be authorized because of the Contractor's failure to incorporate this time into the construction schedule or transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow ten (10) business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Project Officer will advise Contractor when a submittal being processed must be delayed for coordination.
2. Resubmittal Review: Allow ten (10) business days for review of each resubmittal.

F. Identification: Each submittal shall indicate the following:

1. Name of firm or entity that prepared each submittal.
2. Project name.
3. Date.
4. Name and address of Contractor.
5. Name and address of subcontractor.
6. Name and address of supplier.
7. Name and address of manufacturer.
8. Applicable specification section.
9. A unique identifier, such as a submittal number.

G. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Project Officer will discard submittals received from sources other than Contractor.

I. Resubmittals: Make resubmittals in same form as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision and clearly indicate extent of revision.
3. Resubmit submittals until they are marked "approved" or "approved as noted."

J. Use for Construction: Use only final submittals with mark indicating "approved" or "approved as noted" by Landscape Architect/Project Manager.

PART 2 - PRODUCTS

2.01 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's written recommendations.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Manufacturer's catalog cuts.
e. Compliance with specified referenced standards.
f. Testing by recognized testing agency.

C. Shop Drawings: Where required in the Specifications, prepare project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Schedules.
e. Notation of coordination requirements.
f. Notation of dimensions established by field measurement.
g. Relationship to adjoining construction clearly indicated.
h. Seal and signature of professional engineer if required.
i. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 24 by 36 inches. Submittal may be pdf or hard copy.

D. Samples: When required by other specification sections, submit samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit samples that contain multiple, related components such as accessories together in one submittal package.

2. Identification: Attach label on unexposed side of samples that includes the following:

    a. Generic description of sample.
    b. Product name and name of manufacturer.
    c. Sample source.
    d. Number and title of appropriate specification section.

3. Samples for Initial Selection: If colors, textures, and/or patterns are not clearly indicated in the drawings and/or specifications, submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available. If requested by Landscape Architect, contractor shall submit a physical sample.

    a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Project Officer will return submittal with options selected.

4. Samples for Verification: Submit full-size units or samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

    a. Number of Samples: Submit one set of samples. Project Officer will retain the sample set and indicate acceptance or rejection in writing to the Contractor.

2.02 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Project Officer will not return copies.

2. Certificates and Certifications: Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

PART 3 - EXECUTION

3.01 CONTRACTOR'S REVIEW

A. Prior to submittal to Project Officer, review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions.

3.02 LANDSCAPE ARCHITECT'S ACTION

A. Action Submittals: Landscape Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Landscape Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. Approved: A marking of “approved” indicates approval of a submittal for general conformance with the design concept of the Project and with the drawings and specifications.

    a. The Contractor is still responsible for confirming and correlating dimensions at job site, for information which pertains to fabrication processes or construction techniques and for coordination of work of all trades.
    b. Approval of submittals does not relieve Contractor from responsibility for full compliance with the Contract Documents.

2. Approved as noted: A marking of “approved as noted” indicates conditional approval of a submittal.

    a. The Contractor is expected to comply with the revisions or notes indicated by the Landscape Architect in the document. These notes become an integral part of the approved submittal and their acceptance by the Contractor indicates an agreement to comply with the noted requirements.
    b. The Contractor is still responsible for confirming and correlating dimensions at job site, for information which pertains to fabrication processes or construction techniques and for coordination of work of all trades.
    c. Approval of submittals does not relieve Contractor from responsibility for full compliance with the Contract Documents.

3. Revise and Resubmit: Based on the notations provided by the Landscape Architect, make revisions required to comply with the requirements in the Contract Documents, and resubmit for approval.

4. Rejected: The product indicated does not comply with the requirements in the Contract Documents and shall not be used in the Project. Provide submittals for the correct product as indicated in the drawings and specifications.

B. Informational Submittals: Landscape Architect will review each submittal and will not return it or will return it if it does not comply with requirements.

C. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

D. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

B. See Division 1 Section 017700 "Closeout Procedures" for submitting warranties for Contract closeout.

C. See Divisions 3 through 33 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.02 SUBMITTALS

A. Substitution Requests:

1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

    a. Reasons why the specified product cannot be provided.
    b. Coordination information, including a list of changes or modifications needed to other parts of the Work that will be necessary to accommodate proposed substitution.
    c. Detailed comparison of significant qualities of proposed substitution with those of the product specified.
    d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    e. Samples, where applicable or requested.
    f. List of similar installations for completed projects with project names and addresses and names and addresses of Architects and owners, if requested.
    g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    h. Statement of impact on the construction schedule. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
    i. Cost information, including a proposal of change, if any, in the Contract Sum.
    j. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
    k. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2. Project Officer's Action: If necessary, Project Officer will request additional information or documentation for evaluation within five (5) business days of receipt of a request for substitution. Project Officer will notify Contractor of acceptance or rejection of proposed substitution within ten (10) business days of receipt of request, or five (5) business days of receipt of additional information or documentation, whichever is later.

    a. Use product specified if Project Officer cannot make a decision on use of a proposed substitution within time allocated.

1.03 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

1.05 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer’s disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty (if required by other specification sections): Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties (if required by other specification sections): Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.01 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and that are new at time of installation.

1. Standard Products: Unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.

B. Product Selection Procedures:

1. Sole-Source: Where Specifications name a single product and manufacturer without the words "or approved equal," provide the named product that complies with requirements. No substitutions will be accepted.
2. Approved Equal: Where Specifications name a single product and manufacturer accompanied by the words "or approved equal," the specification establishes a minimum standard for design and quality. This should not be construed as eliminating from competition other products of equal or better quality that also satisfy the design intent of the project (as determined by the Project Officer). In this case, either provide the named product that complies with requirements, or submit a bidder Submission of Proposed equivalent items for consideration by the Project Officer in accordance with process described in the solicitation documents.

a. Protocols for Approved Equal Request(s):
   a) When the project is in construction and the specified product(s) cannot be procured due to the following;
   b) Product is no longer available
   c) The County and the Contractor agree that the lead time is too long
   d) If there is a "better" product.
   e) *Contractor shall submit Approved Equal request to Construction Manager for approval.

3. Product List: Where Specifications include a list of manufacturers and products, provide the specified quantity of one of the named products that complies with requirements or an equivalent. Product selected shall be compatible with products previously selected, even if previously selected products were also options. Alternatives not listed will be considered by the Project Officer based on the compliance with specification requirements. To request consideration of an alternative not listed, submit a "Bidder Submission of Proposed Equivalent" for consideration by the Project Officer.

END OF SECTION 016000

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Warranties.
3. Final cleaning.

B. See Divisions 3 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.02 FINAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Project Officer of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Project Officer unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit as-built drawing markups, operation and maintenance manuals, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Project Officer. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Project Officer Owner.
8. Complete startup testing of systems.
9. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
10. Advise Owner of changeover in utilities.
11. Submit changeover information related to occupancy, use, operation, and maintenance.
12. Complete final cleaning requirements, including touchup painting.
13. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Final Completion. On receipt of request, Project Officer will either proceed with inspection or notify Contractor of unfulfilled requirements. Project Officer will prepare the Certificate of Final Completion after inspection or will notify Contractor of items, either on Contractor's list or additional

items identified by the Project Officer, that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Acceptance.

1.03 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Schedule pre-final inspection with Project Officer two weeks before contract completion date.Submit copy of Final Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Project Officer. The copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
2. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
3. Instruct Project Officer in operation, adjustment, and maintenance of products, equipment, and systems.

B Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Project Officer will either proceed with inspection or notify Contractor of unfulfilled requirements. Project Officer will process final payment after inspection or will notify Contractor of construction that must be completed or corrected before payment will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.04 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit copy of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1.05 WARRANTIES

A. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.

3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Provide all of the above in digital format.

B. Provide additional copies of each warranty to include in operation and maintenance manuals.

1.06 FINAL PAYMENT:

Submit final pay application after the following:

1. All punch list items have been corrected and verified by the Project Officer.
2. As-Built Drawings and O/M manuals shall be submitted within 15 days from final completion date and have been submitted and accepted by the Project Officer.
3. All final inspections (plumbing, electrical, final building etc.) have been completed and closed out by the County's Inspection Services Department.
4. All BMP's (if any) shall be approved and certified by DES.
5. LDA permit is closed out by County.
6. All sub-contractors have been paid.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 – EXECUTION

4.01 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Clean each surface or unit to condition expected in an average cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Remove tools, construction equipment, machinery, and surplus material from Project site.

d. Remove snow and ice to provide safe access to site.
e. Remove labels that are not permanent.
f. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair orrestoration.

i. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

g. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
h. Replace parts subject to unusual operating conditions.
i. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
j. Leave Project clean and ready for use.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700

DIVISION 03

CONCRETE

SECTION 033000 – CAST IN PLACE CONCRETE

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes, but is not limited to, the following:

1. Foundation for Site Furnishings and Fieldstone Boulders
2. Foundation for Playground Equipment and Structures
3. Cast-in-Place Walls and Steps

1.2 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

B. 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.

C. Comply with ACI 301, "Specification for Structural Concrete."

D. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For concrete pavement mixture.

C. Delivery Tickets: For concrete including the date, time, truck identification, concrete plant, plant inspector, ticket and load number concrete class and design mix, moisture content of aggregates, quantity and location of placement.

PART 2 – PRODUCTS

2.1 STEEL REINFORCEMENT

D. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

E. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

F. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed, sizes as shown on the drawings.

G. Plain Steel Wire: ASTM A 82, as drawn.

H. Deformed-Steel Wire: ASTM A 496.

I. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice."

2.2 CONCRETE MATERIALS

A. The design of the concrete mix, equipment, workmanship, and materials shall conform to the applicable requirements of Division 3 sections, except as hereinafter specified. Minimum compressive strength after 28 days shall be 3500 psi. Maximum size of aggregate shall be 1- 01/2 inches, but not less than 3/4 inch. Air content by volume shall be 4-1/2 per-cent, plus or minus 1-1/2 percent. The same brand of cement, source of sand, and water/cement ratio shall be maintained for each load of concrete.

1. Provide Class A3 General Use (3,500 psi) concrete for curbs (all) and site furnishing foundations.
2. Provide 4,500 psi concrete for all walls, concrete pavement and steps.
3. Provide concrete for specialty items (playground equipment, fence, shade structures etc.) as per the manufacturer's recommendation.

B. Portland Cement air-entrained, ASTM C 150, Class A3 General Use (3,500 psi) per VDOT 217.

2.3 CURING MATERIALS (non colored concrete)

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth.

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.

2.4 EXPANSION JOINT FILLER

A. Joint filler shall be ½ inch preformed asphalt expansion joint material conforming to ASTM D994 or ASTM D1751.

B. If bituminous fiber material is used, a bond breaker such as one-half (1/2") wide polyethylene tape or five eighths inch (5/8") diameter expanded polyethylene foam backer rod shall be installed as recommended by the manufacturer.

2.5 EXPANSION JOINT SEALANT

A. Expansion Joint Sealant: Sealant shall be one-component polyurethane-base elastomeric sealant. Asphalt cement will not be approved as a substitution. Sealant color shall match color of adjacent pavement. Where joints fall between pavement sections of different colors, color shall be approved by Project Officer and Landscape Architect to match one of the pavement colors.

1. Products: Subject to compliance with requirements, provide one of the following or an approved equal:

a. SikaFlex-1a by Sika Corporation.
b. Sonolastic NP-1 by Sonneborn and Chem Rex Inc.

PART 3 – EXECUTION

3.1 SAMPLING, TESTING AND ENFORCEMENT

A. Sampling and testing shall be performed in accordance with Section 03100- Concrete Formwork Reinforcement and Materials, Arlington County Department of Environmental Services Construction Standards and Specifications.

3.2 PREPARATION FOR PLACING CONCRETE

A. Formwork:

1. General: Construct forms of sound material, and of the correct shape and dimensions shown on the Drawings, constructed tightly and of sufficient strength. Brace and tie the forms together so that the movement of workers, equipment, materials, or placing and vibrating the concrete will not throw them out of line or position. Forms shall be strong enough to maintain their exact shape under all imposed loads. Construct forms that may be easily removed without damage to the concrete. Before concrete is placed in any form, the horizontal and vertical position of the form shall be carefully verified, and all inaccuracies corrected. Complete all wedging and bracing in advance of placing concrete.

2. Chamfered Corners: Unless otherwise indicated, provide chamfered corners on all exposed corners. Provide 3/4 inch moldings in forms for all chamfering required.

3. Form Ties: Use form ties of sufficient strength and in sufficient quantities to prevent spreading of the forms. Place ties at least 1-inch away from the finished surface of the concrete. Do not use ties consisting of twisted wire loops. Leave inner rods in concrete when forms are stripped. Space all form ties equidistant, and symmetrical, and line up both vertically and horizontally.

4. Cleanouts and Access Panels: Provide removable cleanout sections or access panels at the bottom of all forms to permit inspection and effective cleaning of loose dirt, debris, and waste material. Clean all forms and surfaces to receive concrete of all chips, sawdust, and other debris and thoroughly blow out with compressed air just before concrete is placed.

5. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.

B. Preparing the Subgrade: Thoroughly prepare and compact the subgrade as specified in Section 312000 – Earthwork. Subgrade shall be excavated to the required elevation below the finished surface of the pavement in accordance with grades and lines shown on the Drawings.

C. Layout: Cast in place concrete shall have true curves to the radii indicated on the Drawings. No straight segments or tangents shall be approved. A digital CADD file containing the project layout is available from the Project Officer to aid in the installation of cast in place concrete elements.

D. Dewatering: Remove water from excavations before concrete is deposited. Divert any flow of water through proper side drains and remove water without washing over freshly-deposited concrete. Remove hardened concrete, debris, ice, and other foreign materials from the interior of the forms, and from the inner surfaces of mixing and conveying equipment. Secure reinforcing in position and place vapor barrier and have inspected and approved before the concrete is poured. Do not wheel equipment used to deposit concrete over reinforcement.

E. Inspection: After placement of reinforcing steel in the forms, and prior to placing concrete, notify the Project Officer so that proper inspection may be made. Such notification shall be made at least 48 hours in advance of placing concrete to permit proper arrangements for inspection.

3.3 DELIVERY

A. Submit a delivery ticket indicating the mix and design strength of the concrete, design slump, and time of leaving the truck mixer with each batch at the time of delivery. Record on the back of the delivery ticket: (a) the time of arrival of the truck mixer on the site; (b) the time of deposit of the concrete from the truck; and (c) the place of deposit of the concrete. The completed delivery ticket shall be delivered to the Project Officer. Failure to deliver such completed ticket to the Project Officer will be cause for the Project Officer to reject the deposited concrete at any time and cause it to be removed and replaced at no additional expense to the County.

B. All batching of concrete shall be in accordance with the manufacturer's instructions.

C. Do not use concrete on the job site when it has exceeded the allotted mixing time as specified in Section of the 217.09 of the VDOT Specifications.

3.4 PLACING CONCRETE

A. Before placing concrete, remove all construction debris, water and ice from the places to be occupied by the concrete. Give particular attention to the removal of dirt and debris from all formed construction joints.

B. Concrete, when deposited, shall have a temperature ranging between a minimum of 50 degrees Fahrenheit and a maximum of 90 degrees Fahrenheit. When the temperature of the surrounding air is below 50 degrees or above 90 degrees Fahrenheit, concreting shall be done in accordance with the recommendations noted in ACI-306 and ACI-305 respectively.

C. Depositing of concrete shall be in accordance with the manufacturer's instructions.

D. Mix concrete in such quantities as required for immediate use and place prior to loss of slump. Do not re-temper concrete.

E. Spade, work and vibrate concrete as it is being poured, to secure its maximum density, free from voids and completely filling the forms. Thoroughly work concrete to secure the complete envelopment of all parts of the reinforcing steel and completely fill the corners of the forms. Maintain not less than 2 approved vibrators on the work at all times. Use tremies or chutes for drops of more than 5-feet.

3.5 REMOVAL OF FORMS

A. After concrete has been placed, all forms, bracing and supports shall remain undisturbed long enough to allow the concrete to reach the strength necessary to support with safety its own weight plus any live load and earth pressure that might be placed upon it without causing excessive settlement or deflective or any temporary or permanent damage to the structure. Prevent the breaking of edges and corners of concrete in the stripping of forms. Upon removal of formwork, immediately patch honeycombed areas and other voids to the satisfaction of the Project Officer.

B. Thoroughly clean forms and recoat with specified form coating before each reuse. Do not reuse any form for exposed work which cannot be reconditioned to "like new" condition. Discard forms considered unsatisfactory by the Project Officer. Apply form coating to all forms in accordance with the manufacturer's specifications. Apply form coatings before placing reinforcing steel.

3.6 PROTECTION OF NEW WORK

A. Protect all freshly placed concrete from mechanical injury or action of the elements until such time as the concrete is thoroughly set.

B. Protect sleeves, projecting inserts, anchor bolts and other embedded items from disturbances until the concrete has sufficiently set to hold such items.

3.7 CONTROL JOINTS

A. Provide sawn or tooled joints or removable insert strips; depth equal to 1/4 slab thickness. Spacing as required and approved by the Project Officer.

3.8 EXPANSION JOINTS

A. Furnish and install preformed expansion joint material at locations shown on the drawings or every 20 feet on center, minimum, full depth of concrete at approved locations by Project Officer and Landscape Architect. Cut preformed expansion joint material slightly less than the full width of the cross section of the concrete to allow for a liquid joint sealant with any backup material. Provide smooth dowels across joint which permit 1 inch horizontal movement and no vertical shear movement.

B. Tool the concrete edges at expansion or contraction joints to a one-eighth (1/8)-inch radius.

3.9 FINISHING

A. Finishing and caulking of concrete shall be in accordance with the manufacturer’s instructions.

B. Concrete Walls: All areas of exposed concrete walls from the top of the wall to 1 foot below the finished grade of the structure shall be finished in the following manner:

1. After removal of forms, point cavities, stone pockets, and tie holes in exposed surfaces with mortar by thoroughly wetting the repair area. Cut out honeycombs down to dense concrete, and then patch and point as described above. The mortar mix for patching shall be determined by trial to obtain a good color match with the concrete when both patch and concrete are cured and dry. The amount of mixing water shall be as little as consistent with the requirements of handling and placing the mortar.
2. Ground off form joint marks and fins to a smooth surface, dense and free of prominent grain markings and bulges or depressions more than 1/8-inch in 4 feet.
3. When the mortar pointing has set, the entire exposed concrete surface shall be thoroughly covered with water by means of brush and rubbed with carborundum brick to remove all blemishes and leave the entire exposed surface uniform in color and texture.
4. All walls shall receive a light sandblast finish. Prepare mock-up for approval prior to commencing work.

C Concrete Flush Curbs Troweled with Fine-Broom Finish:

1. General: Do not add water to concrete surfaces during finishing operations.
2. 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.
3. 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.

3.10 CURING

A. Curing shall be started as soon as it is possible to apply the curing medium without damaging the surface, preferably immediately upon completion of the finishing operation. Curing shall continue uninterrupted for a minimum period of 14 days. Rapid drying upon completion of the curing period shall be prevented. At no time during the curing period shall the temperature of the concrete be permitted to drop below 40 degrees Fahrenheit.

3.11 DEFECTIVE CONCRETE

A. Defective concrete is defined as concrete in place which does not conform to strength, shapes, alignments, appearance, and/or elevations as shown on the Drawings; areas which contain faulty surface areas and/or concrete surfaces not finished in accordance with the Specifications.

B. Remove all defective concrete and replace in a manner meeting with the Project Officer's approval. Should only surface imperfections occur, patch at the discretion of, and in a manner satisfactory to, the Project Officer. Permission to patch the work shall not be considered as a waiver of the County's right to require complete removal and replacement of such defective work should the patching fail to satisfactorily restore the required quality and appearance of the work.

PART 4 – MEASUREMENT

4.1 The measurement of CAST IN PLACE CONCRETE shall be the number of CUBIC YARDS constructed, including, but not limited to, all labor, materials, equipment and incidental expenses necessary to complete the work in accordance with the plans and specifications to the satisfaction of the Project Officer.

END OF SECTION 033000

DIVISION 10

SPECIALTIES

SECTION 101400 SIGNS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Entry Sign

1.02 RELATED SECTIONS

A. Section 0133000 – Submittal Procedures

B. Section 033000 – Cast in Place Concrete

C. Section 321313 - Cement Concrete Pavement

1.03 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Include plans, elevations, sections of components, and installation details for all signs.

C. Fastening Technique and Bolts

1.04 WARRANTY

A. Sign post and footing shall be guaranteed for a period of five (5) years against defects in materials and workmanship from the date of Final Completion.

B. Sign panel shall be guaranteed for a period of five (5) years against fading or defects in materials/ paint from the date of Final Completion.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver until conditions are ready for installation.

B. Store products in a protected, dry area until ready for installation.

C. Handling: Protect product from damage during handling and installation.

D. Schedule delivery of materials to avoid extended on-site storage and to avoid delaying the Work.

E. Store materials under cover and protected from weather and contact with damp or wet surfaces. Provide for air circulation within and around stacks and under temporary cover-

ings.

F. If delivered and not installing immediately, store units to avoid damage from other construction activities and elements.

1.06 COORDINATION

A. Coordinate with site work and other appropriate sections of the specifications to maintain proper provisions of the work specified.

1.07 QUALITY ASSURANCE

A. Manufacturer shall have worked in the field of sign manufacturing for a minimum of ten (10) years.

B. Examples: Three (3) examples of similar products including location of installation and client contact information

PART 2 - PRODUCTS

2.01 PRODUCTS

A. MANUFACTURER

1. Available Manufacturers: Subject to compliance with requirements, provide the signs by the following or approved equal:

i. Engraphix Architectural Signage, Inc., 132 Hanley Industrial Court, St. Louis, MO 63144 (314) 781-7878

ii. Sign graphics, text layout and color shall be as shown on the drawings and as instructed by Project Officer regarding name and address.

2. Manufacturers Not listed above must meet the following requirements:

i. The vendor(s) shall have a long and established history (no less than five [5] years) of producing high quality, easily maintained and cost-conscious sign fabrications.

ii. The vendor(s) shall have a long-term relationship with municipalities and public entities in the region, such as Arlington County.

iii. The vendor(s) shall be prepared to fabricate sign(s) on time and within acceptable budget provisions while providing the expected quality of craftmanship.

B. MATERIALS

1. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of alloy 5005-H15.

2. Vinyl Film: Opaque, nonreflective vinyl film, 0.0035-inch minimum thickness, with pressure-sensitive adhesive backing, suitable for exterior applications.

3. Colored Coating for Plastic Sheet: Nonfading coatings, including inks and paints for copy and background colors. Use coatings that are recommended by manufacturers for optimum adherence to type of plastic used.

4. Steel Plate: ASTM A36.

5. Steel Tubing: ASTM A500, Grade B

6. Concrete for Postholes: Comply with requirements in Division 3 Section "Cast-in-Place Concrete."

7. Hardware: Hot-dipped galvanized or stainless steel.

C. POSTS

1. General: Fabricate posts to lengths required for mounting method indicated.

   i. Direct-Burial Method: Provide posts 36 inches longer than height of sign to permit direct embedment in concrete foundations.

   ii. Size: As indicated on drawings.

   iii. Colors: As indicated on drawings.

D. SIGN PANELS

1. Unframed Single-Sheet Panels: Provide unframed single-sheet sign panels with edges mechanically and smoothly finished.

2. Panel Material: 0.125-inch-thick aluminum sheet

3. Panel Finish: per plans.

E. TEXT

1. All sign text shall read as shown on the drawings.

F. GRAPHICS

1. Graphic Content and Style: Provide sign copy that complies with requirements indicated in drawings for size, style, spacing, content, mounting height and location, material, finishes and colors of signage.

G. ALUMINUM FINISHES

1. Baked-Enamel Finish: Cleaned with inhibited chemicals; acid-chromate-fluoride-phosphate conversion coating; thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603, medium gloss.

2. Color: as selected by Landscape Architect from manufacturer's full range.

H. ACCESSORIES

1. Mounting Methods: Use fasteners fabricated from materials that are not corrosive to sign material and mounting surface.

I. CONCRETE FOOTING: Per Section 033000 Cast in Place Concrete and detail 3/L-05.

2.02 TEXT

A. Sign text shall read as shown on the drawings.

1. Font Helvatica Bold

PART 3 - EXECUTION

3.01 ASSEMBLY/FABRICATION

A. Shop assemble the sign to dimensions, profiles and details indicated by approved shop drawings.

B. Sand all sides and ease all edges a minimum of 1/16" unless otherwise noted

C. Fit each component together to allow for wood expansion and contraction movement.

D. Locate hardware accurately using templates or roughing-in diagrams to produce an accurately sized and shaped letting of integral hardware.

3.02 METAL FABRICATION

A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines and angles. Separate metals from dissimilar materials to prevent electrolytic action.

B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.

C. Exposed Surfaces: Polished, sanded or otherwise finished. All surfaces smooth, free of burrs, barbs, splinters and sharpness. All edges and ends rolled, rounded or capped.

D. Factory Assembly: Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark items for assembly in the field.

3.03 CONCRETE FOOTING

A. Install concrete footing in accordance with Specification 033000.

3.04 EXAMINATION

A. Examine area to receive sign

B. Notify Project Officer of conditions that would adversely affect installation or subsequent use.

C. Do not begin installation until unacceptable conditions are corrected.

3.05 INSTALLATION

A. Excavation: in firm, undisturbed or compacted soil, drill (or using post-hole digger) hand-excavate holes for posts to diameters and spacing indicated. Excavate hole depths as indicated on the drawings.

B. Install signs level, plumb, and at height indicated, with surfaces free from distortion and other defects in appearance.

C. Setting Posts: Center and align posts in holes 3 inches above bottom of excavation, unless otherwise indicated. Place concrete and vibrate or tamp for consolidation. Check for alignment and hold in position until concrete has achieved its initial set.

D. Comply with requirements in Division 3 Section 033000 ‘Cast in Place Concrete’.

E. Install all work in conformance to the “Architectural Woodwork Standards,” latest edition.

F. Use non-removable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.

G. After installation, clean soiled sign surfaces according to manufacturer’s printed instructions. Protect signs from damage until Final Completion as determined by Project Officer with confirmation by the Landscape Architect.

3.06 CLEANING

A. Clean sign promptly after installation in accordance with manufacturer’s instructions.

B. Do not use harsh cleaning materials or methods that could damage finish.

3.07 PROTECTION

A. Protect installed sign to ensure that, except for normal weathering, sign will be without damage or deterioration at time of Final Completion.

END OF SECTION 101400

DIVISION 12

FURNISHINGS

SECTION 129300 SITE FURNISHINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Sections includes all site furnishings and related installation, including but not limited to, benches, game tables, seating and trash/recycling containers as shown on the Drawings and specified herein.

1.02 RELATED SECTIONS

A. Section 321313 – Cement Concrete Pavement.

B. Section 321123 – Aggregate Base Course and Underdrainage

C. Section 033000 – Cast in Place Concrete

1.03 REFERENCES

A. ADA - Americans with Disabilities Act requirements.

B. ASTM A 36 - Standard Specification for Carbon Structural Steel.

C. ASTM A 123 - Standard Specification for Zinc (hot-dip galvanized) Coatings on Iron and Steel Products.

D. ASTM A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

E. ASTM A312 Standard Specification for Seamless and Welded Stainless Steel Pipes.

F. ASME SA312 Standard Specification for Seamless and Welded Stainless Steel Pipes.

G. ASTM D 522 – Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings

H. ASTM D 523 – Standard Test for Specular Gloss

I. ASTM A 536 - Standard Specification for Ductile Iron Castings.

J. ASTM D 2247 – Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity

K. ASTM D 2794 – Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)

L. ASTM D 3359 – Standard Test Methods for Measuring Adhesion by Tape Test

M. ASTM D 3363 – Standard Test Method for Film Hardness by Pencil Test

N. ASTM G 155 – Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials

O. ISO 1520 Paints and Varnishes – Cupping Test

P. ISO 2815 – Paints and Varnishes – Bucholz Indentation Test

1.04 SUBMITTALS

A. Submittals shall be provided to Project Officer for approval by Landscape Architect under provisions of Section 013300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Available colors, styles, patterns and textures
4. Installation qualification and methods.

C. Selection Samples: Color selections shall be made from the manufacturer's brochure representing manufacturer's full range of available colors and patterns. Provide color chip samples to the Project Officer for confirmation by the Landscape Architect for all metal products and site furnishings and a wood sample for the wood benches.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1. Manufacturer qualifications.

E. Manufacturers warranties as described in Section 1.08.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum of 10 years experience manufacturing site furnishings. A firm experienced in manufacturing site furnishings similar to those required for this project and with a record of successful in-service performance.

B. Installer Qualifications: Minimum of 5 years experience assembling and installing site furnishings. An experienced installer who has completed installation of bicycle parking racks similar in material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.

C. Source Limitations: Obtain each color, finish, shape and type of site furnishing from a single source with resources to provide components of consistent quality in appearance and physical properties.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's original, unopened containers and packaging (with labels clearly identifying product name and manufacturer) until ready for installation. Store in a clean, dry area in accordance with manufacturer’s instructions.

B. Do not deliver until conditions are ready for installation.

C. Handle powder coated furnishings with sufficient care to prevent any scratches or damage to the finish.

1.07 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.08 WARRANTY

A. All site furnishings shall carry a one-year manufacturer’s limited warranty against defects in materials and workmanship. The warranty period begins on the date of Final Completion by the Project Officer.

B. All site furnishings that are powder coated shall carry a five-year warranty. The warranty period begins on the date of Final Completion by the Project Officer.

C. Moveable chairs shall be free from defects in material and/or workmanship for a period of three years from the date of invoice. The warranty does not apply to damage from accident, alteration, misuse, tampering, negligence or abuse. Manufacturer shall, at its option, repair, replace or refund the purchase price of any items found defective upon inspects by an authorized service representative.

PART 2 - PRODUCTS

1.01 MANUFACTURERS

A. Acceptable Bench Manufacturer: Landscape Forms, www.landscapeforms.com

B. Acceptable Trash and Recycling Receptacles Manufacturer: Victor Stanley, Inc., P.O. Drawer 330, Dunkirk, MD 20754, 1-800-368-2573

C. Acceptable Adirondack Chair manufacturer: Knoll/Landscape Forms; www.landscapeforms.com

D. Acceptable Bike Rack Manufacturers: Victor Stanley, Inc. P.O. Drawer 330, Dunkirk MD 20754, 1-800-368-2573

1.02 BENCHES

Style: Generation 50 bench, 6’ length, with armrests, surface mount.

A. Frame: Cast ductile iron, Color TBD

B. Slats: shall be of Ipe of the sizes and dimensions shown on the drawings.

1. Slats shall be be milled perfectly smooth to the finished length. Each slat shall be of one continuous piece; no joints will be allowed. Lumber shall be parallel cut without heart center or sap-wood and shall be straight grained, maximum slope of grain to be 1:10. All milled surfaces shall be sanded smooth on all four sides

and both ends after being worked to the required dimensions. All edges shall be eased to a radius of one-eighth inch (1/8"). All wood shall be thoroughly seasoned and shall contain no more than fifteen percent (15%) to twenty percent (20%) of moisture by weight.

2. Lumber shall be in sound condition, free from worm holes, knots, longitudinal heart cracks, firm or soft sap wood, fungus, and deformation (twisting or cupping) which cannot be removed during installation using normal installation methods and tools. Natural drying checks, to a maximum of one-eighth inch (1/8") in width, will be acceptable. Dimensional tolerance (measured at 20% moisture content) shall be plus or minus .08" in both width and thickness.

3. The County reserves the right to independently identify species of samples of wood taken from the job site. Random samples must be supplied to PRCR for identification, at the request of the Project Officer. Should the wood provided on the job site not be as previously approved, the Contractor shall replace all the incorrect wood at no extra cost to the County.

C. Hardware: Bolts, nuts, and washers used to secure slats to standards shall be stainless steel. Anchor bolts used to secure the benches to pavements may be either stainless steel or hot-dipped galvanized steel. Type and dimensions of all bolts, nuts, and washers shall be as indicated on the plans. Threads of all bolts shall have the ends upset after installation of nuts so as to render the connection vandal resistant.

D. Finish: Surfaces of the cast iron bench standards, bars and brace rods shall be powder coated with a polyester thermosetting Powder Coating as manufactured by Tiger Drylac, Sherwin Williams, PPG or Spraylat, or an approved equivalent. Powder coating shall be applied at a film thickness of 3 to 4 mils (.08 mm to .10 mm) by electrostatic spray process and bake finished per the manufacturer's directions. It shall be applied without voids, tears or cuts that reveal the substrate and shall thoroughly adhere to the metal without peeling when scratched with a pick device or knife blade point.

1. PPG Powder primer PCM70140
2. All surfaces shall first receive hot-iron phosphating treatment.
3. Finish shall pass the Cross Hatch test per ASTM standard, method B.
4. Color: To be specified from manufacturer's full range of colors.

1.03 TRASH RECEPTACLE

A. Victor Stanley Ironsites Model SD-42.

1. Height: 41-3/4 inches (1156 mm)
2. Diameter: 28 inches (841 mm)
3. 3/8" x 1" (9.53mm x 25.4mm) vertical solid steel bar
4. 1/4" x 2-1/2" (6.35mm x 63.5mm) horizontal solid steel bands
5. 3/8" x 3" (9.53mm x 76.2mm) steel support bars
6. 5/8" (15.88mm) solid steel top ring
7. Leveling feet with a 3/8" (9.53mm) diameter threaded steel shaft
8. 36-gallon (136 liter) capacity high density plastic liner
9. Include optional S-2 formed dome lid with opening for depositing trash

10. Metal Finish and Colors: VS Black Powder coated.
11. Mounting plate: Include optional (3) anchor bolt holes.
12. Quantity: 2

1.04 RECYCLING RECEPTACLE

A. Victor Stanley Ironsites Model SD-42.

1. Height: 41-3/4 inches (1156 mm)
2. Diameter: 28 inches (841 mm)
3. 3/8" x 1" (9.53mm x 25.4mm) vertical solid steel bar
4. 1/4" x 2-1/2" (6.35mm x 63.5mm) horizontal solid steel bands
5. 3/8" x 3" (9.53mm x 76.2mm) steel support bars
6. 5/8" (15.88mm) solid steel top ring
7. Leveling feet with a 3/8" (9.53mm) diameter threaded steel shaft
8. 36-gallon (136 liter) capacity high density plastic liner
9. Include optional S-2 formed dome lid with opening for depositing trash and recycling label
10. Metal Finish and Colors: VS Blue Powder coated.
11. Mounting plate: Include optional (3) anchor bolt holes.
12. Include optional recycling package with lid, plaque, and decals; with opening for depositing recyclables in top.
13. Custom dome lid and band decals: Layout ID#4260-01c and #2712-02d.
14. Quantity: 2

1.05 BICYCLE RACKS

A. Victor Stanley Bike Rack BRHS-101 (Cycle Sentry Series).

1. Height: 43-7/8" (30½" above finish grade)
2. Width (outside to outside): 35-3/8"
3. Tube: Schedule 40 Steel Pipe, 2-3/8" O.D.
4. In-Ground Anchoring: Steel anchor tabs welded to each side of bottom of post, secured in concrete footing per construction drawings.
5. Finish and Color: VS Powdercoated Black. Verify with Arlington County Landscape Architect prior to purchase.
6. Quantity: 2
1. Mounting (ADA): Surface Mounted
2. Mounting (Standard): Free-standing

1.06 MANUFACTURER FINISH REQUIREMENTS FOR BICYCLE RACKS, TRASH RECEPTACLES AND RECYCLING RECEPTACLES

A. Site furnishings shall receive an 18-stage finishing process to ensure an extremely durable finish to resist corrosion, chipping, abrasion, cracking and UVA damage.

B. The steel substrate shall be mechanically and chemically etched to ensure proper finish adhesion, followed by a zinc phosphate bath for corrosion resistance.

C. The site furnishing shall then be primed by immersion into a non-chrome seal rinse to enhance and supplement the corrosion resistance.

D. The site furnishing shall then be immersed into an environmentally friendly e-coat epoxy liquid bath to ensure that all surfaces, joints and crevices are covered. The use of silicone caulk for gap filling of joints shall not be allowed.

E. The site furnishing shall be powder coated after complete fabrication with triglycidyl isocyanurate (TGIC) powder, a polyester coating that is electrostatically applied and baked at 400 degrees for 20 minutes.

PART 3 - EXECUTION

3.01 EXAMINATION

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

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

C. Notify Project Officer of conditions that would adversely affect placement or installation of Site Furnishings. Do not begin installation or placement until unacceptable conditions are corrected.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

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

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions unless more stringent requirements are indicated.

B. Surface mounting. Location and drilling of holes for inserts included. Stainless Anchor bolts and inserts to be provided by Contractor.

C. Concrete Footings. Shall comply with requirements in Division 3 Section, Cast in Place Concrete.

D. Benches shall be pre-assembled before being installed in their final location in the work. After assembly, benches shall be installed in their final position and properly secured in place.

E. Provide grout specifically recommended by manufacturer for exterior applications, nonshrink, nonmetallic grout complying with ASTM C 1107.

F. Epoxy Sealer. After the grout has hardened, the remaining space shall be filled with an epoxy sealer fillet, such as Sonneborn Epo-Grip and Epo-Gel Epoxy system, as manufactured by Sonneborn, Shakopee, Mn., or "PG-2089" as manufactured by Permagile Corp., Plainview, N.Y., or approved equal.

G. Threads of all bolts shall have the ends upset after installation of nuts so as to render the connection vandal resistant.

H. After installation, clean soiled surfaces according to manufacturer's written instructions. Provide touch-up paint at finish such that repair is not visible from a distance of six feet.

I. Nuts, washers and ends of all bolts shall be painted with touch-up paint.

3.04 PROTECTION

A. Protect installed products from damage during construction with temporary protection coverings. Remove protective coverings at time of Final Completion as determined by Project Officer.

B. Restore finishes damaged during installation and construction so no evidence remains of correction work. Restore in accordance with manufacturer's instructions/recommendations.

C. Remove and replace damaged components that cannot be successfully repaired as determined by Project Officer.

D. Clean site furnishings promptly after placement in accordance with manufacturer's instructions. Do not use harsh cleaning materials or methods that could damage finish.

END OF SECTION 129300

DIVISION 26

ELECTRICAL

SECTION 260101 - ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. General provisions and requirements for electrical work.

1.02 RELATED SECTIONS

A. Requirements of this section generally supplement requirements of Division 01.

1.03 REFERENCES

A. NFPA 10: Portable Fire Extinguishers.

B. NFPA 241: Safeguarding Construction, Alteration, and Demolition Operations.

1.04 SYSTEM DESCRIPTION

A. The full set of Contract Documents applies to work of Division 26.

B. Visit the site and study all aspects of the project and working conditions, as required by General and Supplementary Conditions, Bidding and Contracting Requirements, Drawings, and Specifications. Verify field dimensions.

C. The work covered in technical sections includes the furnishing of all labor, equipment and materials, and the performance of all operations pertinent to the work described.

D. Except as required otherwise in Division 01, promptly obtain and pay for, all necessary signatures and paperwork, all permits, fees and inspections required for work of this division by authorities having jurisdiction, including any utility connection or extension charge. No payment will be made until a copy of the permit is forwarded to the Project Officer.

E. Electrical work of this project includes, as a brief general description, the following:

1. Exterior lighting.

2. Receptacles.

3. Power distribution.

F. See Division 01 for requirements related to limits on use of site, time restrictions on work, limits on utility outages or shutdowns, and phasing (sequencing) and scheduling.

1.05 PRODUCT OPTIONS

A. Except as modified by provisions of Bidding and Contracting Requirements and Division 01, these options apply to Division 26 specifications.

B. General: Where Contractor is permitted to use a product other than the specified item and model named as the basis of design, Contractor is responsible for all coordination and additional costs as specified in article "Substitutions" below for substitutions.

C. Products specified by reference standards or by description only: Any product meeting those standards or description.

D. Products specified by naming one or more manufacturers, or model name or catalog reference number: Products specified establish a standard of quality, options to be included, and performance.

1. Where other acceptable manufacturers are named, Contractor may provide products of those named manufacturers only, which meet the specifications.

2. Where specification permits "equal" products, without naming other acceptable manufacturers, Contractor may use products of any manufacturer, which meet the specifications.

E. Products specified by naming one manufacturer and particular product, with no provision for other options: No options or substitutions allowed.

1.06 SUBSTITUTIONS

A. Substitutions will be considered only as permitted or required by the Bidding and Contracting Requirements and Division 01. Except as modified by those requirements, the requirements below apply to Division 26 specifications.

B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.

C. Document each request with complete data substantiating compliance of proposed substitution with contract documents.

D. A request constitutes a representation that the Bidder or Contractor:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.

2. Will provide the same warranty for the substitution as for the specified product.

3. Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to Project Officer.

4. Waives claims for additional costs or time extension which may subsequently become apparent.

5. Will reimburse Project Officer for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Substitution submittal procedure is specified in Bidding and Contracting Requirements and Division 01.

1.07 MATERIALS AND EQUIPMENT

A. All materials and equipment shall be new and the best of their respective kinds, suitable for the conditions and duties imposed on them by the project, and of representative manufacturer. The description, characteristics and requirements of the materials to be used shall be in accordance with the specifications.

B. All equipment, construction and installation must meet requirements of local, state and federal governing codes.

C. Singular number: In cases where material, a device, or part of the equipment is referred to in the singular number in the specifications, it is intended that such reference shall apply to as many items of material, devices, or parts of the equipment as are required to complete the installation as shown on the drawings or required for proper operation of the system.

D. Terms have the following meanings:

1. Furnish: Supply item

2. Install: Mount and connect item

3. Provide: Furnish and install

E. All materials and equipment shall be installed and completed in a first class and workmanlike manner and in accordance with the best modern methods, practice and manufacturers' instructions. Any work which shall not present an orderly and neat or workmanlike appearance shall be removed and replaced with satisfactory work when so directed in writing by the Project Officer and Landscape Architect.

F. The specifications and drawings are intended to define the minimum requirements, as to quality of materials, construction, finish and overall workmanship.

G. General Conditions describe the correlation and intent of the Contract Documents. In case of discrepancies between the specifications and drawings, the specifications should be followed as to the general methods and principles and the drawings followed as to sizes, capacities and specifics for corresponding parts. If sizes are omitted, the Project Officer and Landscape Architect will determine sizes to be utilized.

H. In all cases of doubt, uncertainty, or conflict as to the true meaning of the specifications or drawings, it is the responsibility of the Contractor to notify the Project Officer and Landscape Architect of said uncertainty, doubt, or conflict and obtain a decision as to the intent prior to initiating any work which may be affected by this decision.

1.08 COORDINATION

A. Should a situation develop during construction to prevent the proper installation of any equipment or item where shown on the drawings, call the situation to the attention of the Project Officer and Landscape Architect and await a written decision.

B. Plan and coordinate all work to proceed in an orderly and continuous manner without undue delay, and in conformance with the project schedule. Submit samples, shop drawings, schedules, insurance policies and certificates, and the like in time to avoid delays in actual construction. Coordinate electrical work so that work of each trade is completed before other construction begins which would obstruct it.

C. Coordinate trades to ensure that proper clearances between work of the various trades allow access to items which require operation and maintenance.

D. Coordinate location and elevation of all conduit, light fixtures, equipment, and appurtenances in such a manner that the finished installation is as indicated on drawings. In the event difficulties are encountered which prevent this, it is the Contractor's responsibility to bring this to the attention of the Project Officer and Landscape Architect prior to initiation of work. Correct improperly coordinated installation at no additional cost.

E. The Contractors' assistants shall include a competent electrical foreman, who shall be on the premises at all times to check, layout, coordinate and superintend the installation of work. The foreman shall establish all basic requirements relative to the work before starting, and be responsible for the accuracy thereof.

1.09 SUBMITTALS

A. Manufacturers' and subcontractors' lists:

1. As specified in Division 01, submit a complete list of proposed manufacturers for all equipment, materials and subcontractors used for the work of this division. Lists shall follow the sequence of the specifications. No considerations will be given for partial or incomplete lists. After review of lists, submit shop drawings and product data.

B. Shop drawings and product data:

1. Submit in accordance with the requirements of Division 01 or as established at the preconstruction conference, the required number of copies of Shop Drawings and Product Data for every item of equipment. Shop drawings or product data will not be considered until Manufacturers' Lists have been approved. Shop drawings and product data shall be submitted, as required by the General Conditions, with sufficient time for checking, return to Contractor, and resubmission as required before Contractor shall install any item.

2. Each item submitted shall be properly labeled, indicating the specific service for which the equipment or material is to be used, section and paragraph number of specification or drawing number to which it applies, Contractor's name and project name and number. Data submitted shall be specific and shall include product data and printed information in sufficient detail and scope to verify compliance with requirements of the contract documents. Clearly identify each item within the data. Data of a general nature will not be accepted. Each sheet must clearly show the project name and number.

3. The review of a shop drawing or product data shall not be considered as a guarantee of the measurements or building conditions or that the shop drawings or product data have been checked to see that item submitted properly fits the building conditions. This review shall not relieve the Contractor of the responsibility for furnishing material or performing work as required by the contract documents, for correctness of dimensions and quantities, or for proper coordination of details and interfaces among trades.

4. All exclusively electrical items furnished as items associated with mechanical items but not specifically described in the mechanical item submission, shall be submitted as a separate submittal but shall be clearly marked as associated with the mechanical item by identified specification paragraph.

5. Product data sheets shall be 8.5-inches by 11-inches cut sheets for operating and maintenance manual.

C. Submit at least three copies of the results of every test required under any section in this division.

D. Specialist shall submit a list of at least three projects similar to this project in type, size, and quality, which have been in place and operating satisfactorily for at least five years.

1. Include project name, address, name and phone number of Project Officer, and project type and size.

E. After the work is completed, submit all required certificates of approval from approved inspection agencies and authorities having jurisdiction over work of this division. Certificates of approval must be received by the Project Officer and Landscape Architect prior to final acceptance of the work.

1.10 SPECIALIST

A. The term “Specialist” as used in the specification shall mean an individual or firm of established reputation (or, if newly organized, whose personnel have previously established a reputation in the same field,) which is regularly engaged in, and which maintains a regular force of workers skilled in either (as applicable) manufacturing or fabricating items required by the contract, installing items required by the contract, or otherwise performing work required by the contract. Where the specification requires installation by a specialist, the term shall also be deemed to mean the manufacturer of the item, an individual or firm licensed by the manufacturer, or an individual or firm who will perform the work under the manufacturer’s direct supervision.

1.11 CONTRACT CLOSEOUT SUBMITTALS

A. Project record documents:

1. Maintain on site one set of the following record documents; record actual revisions to the work of this division:
   a. Contract Drawings.
   b. Specifications.
   c. Addenda.
   d. Change Orders and other Modifications to the Contract.
   e. Reviewed shop drawings, product data, and samples.

2. Maintain record documents separate from documents used for construction.

3. Record information concurrent with construction progress.

4. Specifications: Legibly mark and record in each section a description of actual products installed, including the following:

a. Manufacturer's name and product model and number.
b. Product options, substitutions, or alternates utilized.
c. Changes made by addenda and modifications.

5. Record documents and shop drawings: Legibly mark each item to record actual construction, including:
   a. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   b. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
   c. Field changes of dimension and detail.
   d. Details not on original Contract Drawings.

6. Submit documents as specified in Division 01.

B. Operation and maintenance data:

1. Submit sets prior to final inspection as specified in Division 01. Unless otherwise specified in Division 01, submit no fewer than three sets. In addition to requirements specified in Division 01, submit operating and maintenance manuals for the work of this division as specified below.

2. Binders: Three-ring binders with vinyl-covered hard covers. Provide large enough binders, and sufficient quantity, that the required contents can be easily turned, removed, and reinserted.

3. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS," and title of project. Print on spine of binder "O & M INSTRUCTIONS." If more than one binder is required, print covers and spines with volume numbers. Include in the front of every binder an index to all binders.

4. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

5. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, typed on white paper.

6. Part 1: Directory, listing names, addresses, and telephone numbers of electrical engineers; contractor; electrical subcontractors; and major electrical equipment suppliers.

7. Part 2: Operation and maintenance instructions, arranged by specification section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
   a. Significant design criteria.
   b. List of equipment.
   c. Parts list for each component, including recommended spare parts list.
   d. Operating instructions.
   e. Maintenance instructions for equipment and systems.
   f. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.

8. Part 3: Project documents and certificates, including the following:
   a. Shop drawings and product data.
   b. Photocopies of certificates.
   c. Photocopies of warranties, guarantees, and bonds.
   d. Test reports: Copies of the results of all tests required under all sections of specifications.

9. Submit one copy of completed volumes in final form 15 days prior to final inspection. This copy will be returned after final inspection, with Engineer comments. Revise content of documents as required prior to final submittal.

10. Submit final volumes revised, within ten days after final inspection.

1.12 REGULATORY REQUIREMENTS

A. When these specifications call for materials or construction of a better quality or larger sizes than required by the following codes and standards, the provisions of the specifications shall take precedence.

B. Provide, without extra charge, any additional materials and labor which may be required for compliance with these codes and standards even though the work is not mentioned in these specifications or shown on the contract drawings.

C. Perform the work of this division in strict accordance with the following authorities. The latest revision of these codes accepted by the authority having jurisdiction as of the date of the contract documents shall apply.

1. The electrical, building, fire, and safety codes of the state and county or city in which the work is being performed.

2. The National Electric Code, NFPA 70 (NEC).

3. The National Fire Protection Association Code (NFPA).

4. International Building Code (IBC).

5. International Energy Conservation, Fire, and Electrical Codes (ICC).

1.13 REFERENCE STANDARDS

A. Perform the work of this division using the standards of the following organizations, as referred to in technical sections, as a minimum requirement for construction and testing. Unless specified otherwise in Bidding and Contract Documents or Division 01, the latest revision current as of the date of the contract documents shall apply.

1. Factory Mutual (FM)

2. American National Standards Institute (ANSI)

3. American Society for Testing and Materials (ASTM)

4. International Code Council (ICC)

5. Institute of Electrical and Electronics Engineers (IEEE)

6. National Electrical Code (NEC) (NFPA 70)

7. National Electrical Manufacturer's Association (NEMA)

8. National Fire Protection Association (NFPA)

9. The Occupational Safety and Health Act (OSHA)

10. Underwriters Laboratory Inc. (UL)

11. American Association of State Highway and Transportation Officials (AASHTO)

12. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)

13. Illuminating Engineering Society of North America (IESNA)

1.14 TEMPORARY STORAGE

A. Maintain upon premises, where directed, a storage area, and be responsible for all contents within these areas. Provide all security measures necessary for this area.

B. Area shall be maintained and shall be returned to original condition at the completion of the project.

C. Store electrical construction materials such as wire, raceways and boxes, devices, and equipment in buildings, enclosed trailers, or portable enclosed warehouses.

1. Materials and products subject to damage from moisture: Store in dry locations. If necessary, protect with protective wraps or covers.

2. Plastics and other materials and products subject to damage from heat or cold: Store at manufacturer's recommended temperatures.

3. Plastics and other materials and products subject to damage from sunlight: Protect from sunlight.

D. Electrical equipment such as motor controllers, panelboards and circuit breakers stored before installation and installed during construction: Provide clean, dry locations at manufacturer's recommended temperatures, and cover or wrap if required to protect from incidental damage.

1.15 PROTECTION

A. Each trade and subcontractor is responsible for preventing damage and soiling of work performed by other trades or subcontractors. Each trade and subcontractor is responsible for providing temporary protection of its own work.

1. Protect work from spills, splatters, drippings, adhesives, bitumens, mortars, paints, plasters, and damage from welding or burning.

2. Protect finished work from damage, defacement, staining, or scratching.

3. Protect finishes from cleaning agents, or grinding and finishing equipment.

4. Protect adjacent and finished work from damage, using tape, masking, covers or coatings and protective enclosures.

5. Coordinate installations and temporarily remove items to avoid damage from finishing work.

B. Repair all damage or soiling to the complete satisfaction of the Project Officer and Landscape Architect; replace any materials or work damaged to such an extent that they cannot be restored to their original condition, all at no addition to the Contract sum.

C. Protect work stored in place and supplies stored in the building.

1. Store materials and products, subject to damage from moisture, in dry locations. If necessary, protect in wraps or covers.

2. Store plastics, other materials, and products subject to damage from heat or cold at manufacturer's recommended temperatures.

D. Protect electrical materials and products from weather events and accidents of construction.

E. Use of sidewalk or roadway areas outside of the property lines shall be with permission and approval of the local authorities having jurisdiction.

1.16 FIRE PROTECTION

A. As a minimum, provide hand-carried, portable, UL-rated extinguishers with each work crew working inside the building.

B. Select extinguishers in accordance with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

1.17 PROJECT CONDITIONS

A. Drawings showing utilities in concealed locations are based on the best information available but are not represented as being precisely correct. Work of the contract includes digging, cutting, drilling, using nondestructive methods, and other methods of locating concealed utilities in the field, as well as patching and repairing as specified in "Cutting and Patching" below.

B. If, in the course of the work, workers encounter a material they suspect to present some hazard:

1. Promptly notify the Project Officer and Landscape Architect in writing.

2. Do not perform any work which would disturb the suspected material until written instructions have been received.

1.18 WARRANTY

A. All work and equipment provided as work of this division shall be fully warranted under the general project warranty. In addition, provide added special warranties as specified in individual sections.

B. During the correction period, the Contractor shall begin correcting any work found to be not in accordance with the requirements of the Contract Documents within 4-hours of receiving written notice from the Project Officer. Provide detailed schedule for completion of work within 24-hours of receiving written notice from the Project Officer and revise schedule based on any Project Officer comments generated. Except as otherwise required in General Conditions and Division 01, the correction period is one year after the date of substantial completion of the work. Work requiring correction shall promptly be repaired or completely replaced at no addition to the Contract Sum.

1. Service reports for warranty work shall be provided to the Project Officer.

C. When use of the permanent equipment has been permitted for temporary services during construction of the building, the warranty and correction periods shall nevertheless begin at the time of substantial completion, unless another date of acceptance has been agreed to by the Project Officer.

D. Special warranties are warranties required by individual specification sections, incidental product warranties, manufacturers' standard warranties, installer or subcontractor service agreements, and other individual warranties in addition to the general project warranty.

E. Provide copies of warranties as required for Operation and Maintenance Manual specified above, and by Division 01.

F. For items of work delayed beyond date of substantial completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 CUTTING AND PATCHING

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

B. Cut walls, floors, partitions, roofs, and other appurtenances for the passage or accommodation of conduits. Close superfluous openings and remove all debris caused by work of this division.

C. No cutting of any structure or finish shall be done until the condition requiring such cutting has been examined and approved by the Project Officer and Landscape Architect.

D. New or existing surfaces disturbed as a result of such cutting or otherwise damaged shall be restored to match original work and all materials used for any patching or mending shall conform to the class of materials originally installed.

E. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

3.02 TEMPORARY FACILITIES

A. Temporary water facilities, electricity, telephone, toilet facilities, and temporary heat, shall be provided as specified in Division 01.

3.03 PROGRESS MEETINGS

A. Progress meetings shall be held as specified in Division 01, and also when and if the Contractor, Project Officer or Landscape Architect finds them necessary or advantageous to progress of work.

B. Contractor, those subcontractors and those material suppliers concerned with current progress or with the scheduling of future progress, Landscape Architect and Project Officer shall each be represented at these meetings by persons familiar with the details of work and authorized to conclude matters relating to work progress.

END OF SECTION 260101

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Requirements applicable to work of more than one section of Division 26.

B. Testing wiring systems.

1.02 RELATED SECTIONS

A. Operation and Maintenance Manuals: Division 01 and Section 260101.

B. Painting: Division 09.

1.03 DEFINITIONS

A. Project correction period: A period after Substantial Completion of the work during which the Contractor shall correct every part of the work found to be not in accordance with the requirements of the contract documents, promptly after receipt of written notice.

B. Qualified testing agency: A Nationally Recognized Testing Laboratory (NRTL), a National Voluntary Laboratory Accreditation Program (NVLAP), or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

1.04 DESIGN REQUIREMENTS

A. The drawings and system performances have been designed on the basis of using the particular manufacturers' products specified and scheduled on the drawings.

B. Products of other manufacturers that are listed under the article "Acceptable Manufacturers," or permitted as "equal," are permitted provided:

1. Product shall meet the specifications.

2. Contractor shall make, without addition to the contract sum, all adjustments for deviations so that the final installation is complete and functions as the design basis product is intended.

C. Do not propose products with dimensions or other characteristics different from the design basis product that make their use impractical or cause functional fit, access, or connection problems.

D. The contract drawings are generally diagrammatic, and do not indicate all fittings or offsets in conduit or all pull boxes, access panels, or other specialties required.

1. Install conduit exposed to view parallel with the lines of the building and as close to walls, columns, and ceilings as may be practical, maintaining adequate clearance for access at parts requiring servicing.

2. Install conduit a sufficient distance from other work to permit a clearance of not less than 0.5 inch (15 mm) between its finished covering and adjacent work.

3. No conduit shall be run below the head of a window or door.

4. Pull boxes and other appurtenances which require operation or maintenance shall be easily accessible. Do not cut or form handholes for operation or maintenance of appliances through walls or ceilings.

1.05 SUBMITTALS

A. Test reports: Show that tests specified in Part 3 below demonstrate the specified results.

1.06 QUALITY ASSURANCE

A. Provide materials and perform work in accordance with the electrical, building, fire, and safety codes and regulations of the state, county, or city in which the work is performed.

B. Electrical control panels, equipment, materials and devices provided or installed as work of Division 26 shall bear UL label, or, if UL label is not available, the item shall be tested and labeled by a qualified testing agency, acceptable to authorities having jurisdiction, and in accordance with NFPA 70. Provide testing, if required, without addition to the contract sum.

C. VOC content: Field-applied adhesives and sealants, limits per South Coast Air Quality Management District (SCAQMD), Rule No. 1168.

D. Products shall contain no urea-formaldehyde content.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Electrical equipment backing panels: Plywood, DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated in accordance with AWPA C27, in thickness indicated, not less than 0.5 inch (13 mm) nominal.

1. One side finished.

B. Wood-preservative-treated lumber: Treated by pressure process, AWPA C2, with chemicals acceptable to authorities having jurisdiction, and marked with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. Application: Treat items indicated on the drawings, and the following:
   a. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, or waterproofing.

b. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
c. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
d. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
e. Wood floor plates that are installed over concrete slabs-on-grade.

C. Aircraft cable: 0.25-inch (6-mm) steel wire rope, galvanized, construction 7 by 19 strands, minimum 7000 lbs (31138 N) breaking strength.

2.02 DATE-SENSITIVE EQUIPMENT

A. Date-sensitive equipment: Systems, equipment, or components which use or process date and time data in order to perform their functions.

B. Each item of date-sensitive equipment used in the project shall be warranted by the manufacturer to properly function and correctly use or process all time-related data for all dates and times which occur during a reasonable life expectancy of the equipment.

PART 3 - EXECUTION

3.01 INSTALLATION OF PRODUCTS AND EQUIPMENT

A. Manufacturers' instructions: Except as modified by drawings or specifications, install products and equipment in accordance with manufacturers' instructions and recommendations applicable to the project conditions.

1. Immediately notify Project Officer and Landscape Architect if a difference or discrepancy is found between manufacturers' instructions and the drawings or specifications.

B. Install plywood backing panels with finished face exposed.

3.02 TESTS

A. During the progress of the work and after completion, test the branch circuits and distribution system.

B. Results of the tests shall show that the wiring meets the requirements of this specification. Should any test indicate defect in materials or workmanship, immediately repair, or replace with new, the faulty installation, and retest the affected portions of the work.

C. Furnish equipment and instruments necessary for testing.

D. Tests shall demonstrate the following:

1. Lighting, power, and control circuits are continuous and free from short circuits.

2. Circuits are free from unspecified grounds.

3. The resistance to ground of each non-grounded circuit is not less than one megohm.

4. Circuits are properly connected in accordance with the applicable wiring diagrams.

5. Circuits are operable. Demonstration shall include functioning of each control not less than ten times, and continuous operation of each lighting and power circuit for not less than 0.5 hour.

E. Test circuit breakers larger than 100 amps at full voltage.

F. Make voltage built-up tests with a voltage sufficient to determine that no short circuits exist.

G. Immediately repair defects and retest until systems are operating correctly.

H. Submit test reports.

3.03 OPERATING INSTRUCTIONS

A. Furnish the necessary technicians, skilled workers, and helpers to operate the electrical systems and equipment of the entire project for one 8-hour day.

B. Where specified in technical sections, provide longer periods required for specialized equipment.

C. Instruct the Project Officer or designated personnel in operation, maintenance, lubrication, and adjustment of systems and equipment.

D. The Operating and Maintenance Manual shall be available at the time of the instructions for use by instructors and Project Officer personnel.

E. Schedule the general and specialized instruction periods for a time agreed upon by the Project Officer and Landscape Architect.

END OF SECTION 260500

SECTION 260501 -EXCAVATION AND FILL FOR ELECTRICAL WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Trenching, backfilling, and compacting for electrical work underground as shown on drawings.

1.02 RELATED SECTIONS

A. Cutting and patching: Division 01 and Section 260101.

B. Repairing pavements: Division 32.

C. Underground electrical ductbanks: Section 260544.

D. Conduit: Section 260533.

1.03 REFERENCES

A. ASTM D 1557: Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbs/cu ft (2700 kN-m/cu m).

1.04 SUBMITTALS

A. Shop drawings: At the same scale as the contract drawings, showing field verified locations of utilities, and proposed detailed trenching plan.

B. Certifications: Test reports showing that compaction meets specified requirements.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Backfill: Earth materials, free from perceptible amounts of wood, debris, or topsoil, free of frost at the time of placement, and not containing marl or other elements which tend to stay in a plastic state.

2.02 EQUIPMENT

A. Mechanical tampers for compacting backfill: Capable of exerting a blow equal to 250 pounds per square foot (12 kPa) of area of the tamping face.

PART 3 - EXECUTION

3.01 PREPARATION

A. Contact local utility company underground information service Dominion Virginia Power (Miss Utility) before beginning excavation outside buildings.

B. The general locations of underground utilities are indicated on the drawings and are not to be assumed to be accurate or complete. Before beginning work, field check the area with the most accurate instruments available, such as Fisher Labs' Pipe and Cable Locators.

3.02 INSTALLATION

A. Perform all excavating, cutting of paved areas, trenching, sheeting, shoring, backfilling, and compacting required for the proper installation of the work. Repair of pavement is specified in Division 32.

B. Where obstructions are encountered, obtain written approval and make necessary changes in line, grade or location.

C. Protect existing utilities from damage during excavation and backfilling. Repair damaged new or existing work at no addition to the contract sum. Bracing, shoring and other protection of existing utilities is part of this work.

D. Do not damage or remove existing shrubs or trees including their root systems, without prior notification to the Project Officer and Landscape Architect.

E. Provide temporary roadways over trenches with railings and other safeguards, including amber blinker lamps or other warnings for night use.

F. Note the depths of footings. In cases where conduit is in close proximity to or below footings and where the natural earth under footings is disturbed, after the line is installed, the voids shall be filled up to bottoms of such footings with solid concrete.

3.03 CUTTING

A. Cut concrete and asphalt concrete with masonry saw prior to breaking it into smaller pieces for removal.

B. Cut sidewalks perpendicular to the length at the closest existing joint that is a minimum of 24 inches back from either side of the top of the new trench.

3.04 TRENCHING

A. Excavations inside the building shall be carefully planned. Stockpile excavated earth so as not to interfere with other construction. Dig trenches to the proper depths, providing extra depressions where required for hubs of pipes.

B. Excavations outside the building shall generally follow the routes indicated on the drawings. Stockpile topsoil separately for later replacement. Excavations shall be of sufficient depths to provide, unless indicated otherwise on the drawings, a minimum cover as follows:

1. Electrical conduit: Depth required by NFPA 70 (NEC).

C. Trenches shall be of necessary depth and width for the proper laying of conduit with a minimum of 8 inches (205 mm) on each side of the joint.

1. The sides shall be as nearly vertical as practicable. Unless local regulations are more strict, trenches 4 ft. (1220 mm) and deeper shall have shored sides as required by OSHA trenching regulations.

2. The bottoms of trenches shall be accurately graded to provide uniform bearing and support for each section of conduit on undisturbed soil at every point along its entire length, except for bell holes.

3. No greater length of trench shall be left open, in advance of the completed structure placed in it, than can be completed in that day's operation.

4. Except where rock is encountered, do not excavate below the depths required. Where rock excavation is required, excavate to a depth of at least 6 inches (150 mm) below the trench depth and fill the overdepth with compacted crusher run or bank run stone or sand. Unauthorized overdepths in excavation shall be backfilled with crushed stone, slag or gravel, thoroughly compacted.

5. Whenever wet or otherwise unstable soil is encountered, it shall be removed to the depth and extent directed, and the trench backfilled to the proper grade with crushed stone, slag or gravel.

D. Should springs be encountered within the work area, or soft soil conditions at the elevations required for load bearing, immediately notify the Project Officer and Landscape Architect and do not place any portion of the work on such surfaces until instructions are received.

E. Furnish and maintain pumps, flumes, gutters, and appurtenances if required to keep the excavations free from water. Water shall be directed to a point remote from building operations, shown on the approved shop drawing.

F. Excavation for handholes and similar structures shall be sufficient to leave a minimum of 12 inches (305 mm) and a maximum of 24 inches (610 mm) clearance on all sides. Fill over-depth excavation with concrete.

3.05 BACKFILL

A. Place no backfill until the adjacent construction or the utility to be covered has been inspected, tested, and approved.

B. Installing underground warning tape: Install in backfill above exterior buried lines not encased in concrete. Select legend and color appropriate for type of line. Install metallic lined tape for non-metallic lines. Install approximately 12 inches (305 mm) below grade.

C. Electrical systems backfill:

1. Backfill and compact in 8-inch (200-mm) layers, to level finished grade with the excavated materials approved for backfilling.

2. Surplus earth shall be mounded up on excavation and left to settle. When directed by the Project Officer and Landscape Architect, surplus earth shall be removed and excavations leveled off to proper grade. Where direct burial cables are placed in trenches, first cover the cables with clean earth.

D. Structure backfill:

1. Do not backfill against structures with cement mortar joints until the mortar is at least twelve hours old.

3.06 COMPACTION

A. Test in accordance with the requirements of ASTM D 1557.

B. Compact under slabs, roads, and sidewalks to a 95 percent density.

C. Compact unpaved areas to a 90 percent density.

D. Backfill and compact trench in unpaved areas to within 4 inches (102 mm) of existing grade. Furnish and install compacted select topsoil for the final layer to finish even with existing grade. Remove surplus earth and rake unpaved areas for final planting.

E. Take particular care in compaction of earth under joints of mechanical piping.

3.07 RESURFACING

A. Resurface sidewalks, roads, streets, and other paved areas as work of this section, matching the construction and finish of adjacent paving. Paving shall meet the requirements of Division 32.

END OF SECTION 260501

SECTION 260519 - WIRES AND CABLES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Wire and cable rated 600-volts and less.

B. Type MC, Type AC-HCF, and Type NM cables are not permitted.

1.02 RELATED SECTIONS

A. Underground ducts and utility structures: Section 260544.

B. Conduits: Section 260533.

1.03 REFERENCES

A. ANSI/NEMA WC 70 – Power Cables rated 2000 Volts or Less for Distribution of Electrical Energy.

B. ASTM B3 – Standard Specification for Soft or Annealed Copper Wire.

C. ASTM B8 – Standard Specification for Concentric-Lay-Stranded Copper Conductors.

D. UL 44 – Standard for Thermoset-Insulated Wires and Cables.

E. UL 83 – Standard for Thermoplastic-Insulated Wires and Cables.

F. Additional UL Standards as indicated.

1.04 SUBMITTALS

A. Product data:

1. Each type of wire and cable, including accessories.

2. Include copies of UL certifications showing compliance with requirements in “Quality Assurance” below.

1.05 QUALITY ASSURANCE

A. Electrical components, devices, and accessories: Listed and labeled as defined in NFPA 70 Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Products and installation shall comply with NFPA 70 and other applicable national, state, and local electrical codes.

1.06 DELIVERY, STORAGE, AND HANDLING

A. General requirements: Deliver, store, and handle wire and cable in accordance with the manufacturer's instructions.

1. Wire and cable shall be packaged in a manner that protects them during ordinary handling and shipping. Ship from manufacturer with ends temporarily sealed against moisture.

2. Protect wire and cable during storage (both onsite and offsite).
   a. Store in a clean and dry location. Elevate from surfaces where water can accumulate, and cover cable rolls to protect against weather.

3. Handle wire and cable as recommended by the manufacturer. Do not pull from the center or periphery of the cable reel.

4. Damaged wire and cable shall be removed from the project site.

PART 2 - PRODUCTS

2.01 COPPER BUILDING WIRE (600-Volts Max.)

A. Conductors: UL listed and NEMA WC 70 compliant; Copper, 98 percent conductivity, suitable for 600-volt duty; rated 90-degree Celsius temperature for wet/dry applications; solid bare annealed copper for No. 10 and smaller complying with ASTM B 3, and stranded for No. 8 and larger complying with ASTM B 8.

B. Conductor insulation:

1. Type THHN/THWN-2: Comply with UL 83; PVC insulation, nylon jacket.

2. Type RHH / RHW-2: Comply with UL 44; stranded conductors, XLPE insulation.

C. Conductor identification: Markings along outer braid denoting conductor size, voltage classification, type of insulation, and manufacturer's trade name, and color code. Identification shall extend to branch circuits and outlets. Use the color coding system tabulated below throughout the building's network of feeders and circuits, unless otherwise required by the authority having jurisdiction.

1. Colors on conductors No. 10 and smaller, or No. 6 and smaller for grounded and grounding conductors: Solid colored insulation.

2. Colors on conductors No. 8 and larger, or No. 4 and larger grounded and grounding conductors: Colored tape wrapped a minimum of 6 inches (150 mm) on either end of conductor.

COLOR CODE				
VOLTAGE	NEUTRAL	PHASE		
		A	B	C
120-V, 2-wire	White	Black, Red, or Blue, depending on phase		
240/120-V, single phase, 3-wire	White	Black	Red	

D. Wires used solely for grounding purposes shall be green, where insulated.

E. Control wiring shall be coded with colors different from those used to designate phase wires.

2.02 WIRING ACCESSORIES

A. Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service where installed.

B. Twist-on wire connectors (dry locations): Color-keyed, Ideal Industries, Inc., Wingnut®, 3M Company "Scotchlok", or equal by King Innovation.

C. Twist-on wire connectors (damp and wet locations): Ideal Industries, Inc., UnderGround®, models 60, 64, or 66 as appropriate; King Innovation DryConn®; or equal by 3M Company. Connectors shall be listed under UL 486D.

D. Compression connectors: Color-keyed, 3M Company "Scotchlok"™ compressor connectors, "10000" series for copper conductors or equal by Thomas & Betts (Blackburn) or Ilsco.

E. Compression connectors (damp and wet locations): Protect the connector's with a waterproof system, UL-listed for direct burial and 600 volts: 3M Company 8420 series, Thomas & Betts Model DBSK82, or equal by IIsco.

F. Compression taps: Series CT-2 tap with CT-2C cover, or Series 54710 color-keyed compression taps, Burndy Corporation "Versitap" or equal by OZ/Gedney.

G. Power distribution blocks: Equal to Hubbell Burndy “U-Blok.”

2.03 UNDERGROUND CONDUCTORS

A. Underground cable, Type RHH/RHW-2: Single-conductor, underground cable.

1. Cable: UL 44 listed; NEMA WC 70 construction; 600-volt, single-conductor. Solid copper No. 10 and smaller, stranded copper No. 8 and larger; and with XLPE insulation.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Provide wire and cable indicated in accordance with national, state, and local electrical codes.

B. Conceal wire and cable in new construction and in locations with finished walls, ceilings, and floors unless otherwise noted on drawings.

C. Wire and cable serving systems over 100-volts shall be installed in raceways, except where otherwise noted on drawings.

D. Wire and cable serving systems rated below 100-volts shall be installed in raceways, except where otherwise noted in individual specification sections. Refer to paragraph "INSTALLING CABLE RATED BELOW 100-VOLTS" below for additional information.

3.02 INSTALLING EXTERIOR WIRING

A. Sizes: Minimum sizes shall be as follows, unless a larger size is indicated on the drawings.

1. Exterior lighting circuits: Copper, No. 12 minimum.

B. Wiring methods and locations: Wires and cables shall be installed based on the following requirements, unless otherwise noted.

1. Feeders and branch circuits, exposed: Type THHN/THWN-2, single conductors in raceway.

2. Feeders and branch circuits, underground: Type RHW-2, single conductors in raceway.

3. Service entrance: Type THHN/THWN, single conductors in raceway.

C. Splicing shall be done in outlet boxes and junction boxes and not in conduit. Treat these boxes as wet locations.

1. Conductors No. 8 and larger: Terminated, spliced and taped, wherever practical, with compression connectors. Use tools recommended by the manufacturer.

2. Splices in conductors No. 10 and smaller, including lighting fixtures: Made with wire connectors.

3. Taps in conductors No. 6 and larger: Made with compression taps or power distribution blocks.

END OF SECTION 260519

SECTION 260521 - WIRING CONNECTIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Power and control wiring for equipment.

1.02 RELATED SECTIONS

A. Equipment: Installed items requiring electricity, specified in other sections or shown on drawings.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Conduits, wires and cables, devices, and accessories as specified in other sections.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Except where provided with equipment, furnish and install manual pushbutton stations and pilot lights, with wiring. Where stations and pilot lights are grouped at central locations, mount them under a common faceplate.

B. Rough in and connect to equipment furnished under other sections and equipment furnished by Project Officer. Make connections as indicated on drawings with exact locations and details determined by approved shop drawings of the equipment.

1. Under equipment sections, equipment will be set in position and the electrical devices and components furnished loose. Assemble, install, and wire under this section.

2. Accomplish rough-in from walls with flush outlet boxes and from floors by means of conduit couplings finishing flush with finished floor.

C. Certain equipment, as indicated, will be furnished with control panels and auxiliary control components. Mount the panels, furnish and install source wiring and disconnects, and completely connect controls and motors.

D. Provide power sources for Project Officer-furnished equipment.

END OF SECTION 260521

SECTION 260526 - GROUNDING AND BONDING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding electrical systems and equipment.

B. Ground system test.

1.02 REFERENCES

A. ANSI/TIA/EIA J-STD-607

B. IEEE STD 142

C. NFPA 70

D. ASTM F467 and F468

E. UL 467

1.03 DEFINITIONS

A. Area served by a separately-derived system: The area within the building that contains any part of a circuit of the system.

1.04 SUBMITTALS

A. Certifications: System test.

PART 2 - PRODUCTS

2.01 MANUFACTURED UNITS

A. Ground conductor, unless specifically noted otherwise, shall be copper, 98 percent conductivity, solid for No. 10 AWG and smaller and stranded for No. 8 AWG and larger.

B. Mechanical type ground connectors:

1. Connectors: IEEE 837 and UL 467 compliant, equal to FCI Burndy G Series, listed for use for specific types, sizes, and combinations of conductors and connected items.

2. Nuts, bolts, and washers: Silicon bronze alloy type B per ASTM F467 and F468.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Provide the complete grounding of conduit systems, electrical equipment, conductor and equipment enclosures, and neutral conductors in accordance with applicable codes. Grounded phase and neutral conductors shall be continuously identified. Continuity of metal raceways shall be insured by double locknuts.

3.02 EQUIPMENT GROUNDING AND BONDING

A. Provide insulated equipment grounding conductors to all feeders and branch circuits.

3.03 APPLICATIONS

A. Underground grounding conductors: Install bare copper conductor, No. 2/0 AWG minimum.

1. Bury at least 24 inches (600 mm) below grade.

3.04 GROUNDING SYSTEM TEST

A. Ensure that grounding system is continuous and that resistance to earth is not more than 10 ohms.

B. Make resistance measurements in dry weather, not earlier than 48 hours after rainfall.

C. Submit written results of each test including location of rods as well as resistance and soil conditions at time measurements were made.

END OF SECTION 260526

SECTION 260528 - EQUIPMENT FOUNDATIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Outdoor equipment foundations.

1.02 RELATED SECTIONS

A. Service entrance: Section 260541.

1.03 SUBMITTALS

A. Product data: Concrete mix, grout, reinforcement, and accessories.

B. Certifications: Test report showing strength of concrete.

PART 2 - PRODUCTS

2.01 CONCRETE

A. Concrete:

1. Outdoor: 4,500 psi (31.0 MPa) compressive strength at 28 days.

2.02 GROUT

A. Non-shrink grout: Premixed, consisting of non-metallic aggregate, cement, water-reducing and plasticizing agents; capable of developing minimum compressive strength of 7,000 psi in 28 days.

1. Five Star Products, Inc. “Five-Star Grout”

2. L&M Construction Chemicals, Inc. “Crystex”

3. Sonneborn “Sonogrout”

2.03 METAL REINFORCEMENT

A. Reinforcing bars: Deformed steel bars in accordance with ASTM A615, Grade 60, clean and free from loose rust, scale, or other coatings that will reduce bond.

B. Welded wire fabric reinforcing: ASTM A 185 No. 6 steel wire spot-welded at intersections and of size 6 by 6 inch mesh.

C. Metal accessories: Include spacers, chairs, bolsters, ties, and other devices necessary for properly placing, spacing, supporting and fastening reinforcement in place.

PART 3 - EXECUTION

3.01 INSTALLING OUTDOOR EQUIPMENT FOUNDATIONS

A. Provide equipment foundations of size and thickness indicated.

B. Place reinforcement accurately in position shown, securely fasten, and support to prevent displacement before or during pouring. Clean, bend, place, and splice reinforcement in accordance with approved shop drawings. Lap ends and sides of mesh reinforcement in slabs not less than one mesh.

1. Coverage of main reinforcing shall be as follows: Slabs, 0.75 inch (19 mm); concrete poured against earth, 3 inches (75 mm); other locations, 2 inches (50 mm).

C. Properly align, level, and grout equipment.

END OF SECTION 260528

SECTION 260533 - CONDUITS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Conduit and accessories, aboveground and below ground where not in duct banks.

1.02 RELATED SECTIONS

A. Exterior duct banks and handholes: Section 260544.

B. Trenching: Section 260501.

1.03 DEFINITIONS

A. FMC: Flexible metal conduit.

B. LFMC: Liquid-tight flexible metal conduit.

1.04 SUBMITTALS

A. Product data:

1. Each type of conduit included in the work, and related fittings.

2. Accessory materials.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

B. Steel conduit and tubing:

1. AFC Cable Systems, Inc. (FMC and LFMC)

2. Allied Tube & Conduit; a Tyco International Ltd-Co.

3. O-Z/Gedney, Unit of General Signal

4. Wheatland Tube Co.

C. Steel conduit fittings:

1. Appleton Electric Co.

2. Cooper Crouse-Hinds.

3. Hubbell, Inc.; Killark Electric Manufacturing Co.
4. O-Z/Gedney; Unit of General Signal.
5. Spring City Electrical Manufacturing Co.
6. Thomas & Betts Corporation
7. Wheatland Tube Co.

D. Nonmetallic conduit, tubing and fittings:

1. Allied Tube & Conduit; a Tyco International Ltd. Co.
2. Arnco Corp.
3. Beck Manufacturing
4. CANTEX Inc.
5. Certainteed Corp.; Pipe and Plastics Group
6. Lamson & Sessions; Carlon Electrical Products

E. Wiring troughs and fittings:

1. Hoffman Engineering Co.
2. Lamson & Sessions, Carlon Electrical Products
3. Square D Schneider Electric

F. Fasteners:

1. Caddy Fasteners by Erico Products Inc
2. ITW Ramset “Red Head”
3. Wej-It Fastening Systems

2.02 CONDUIT AND FITTINGS

A. Galvanized steel conduit: Hot-dip galvanized with threads galvanized after cutting, one of the following:

1. Rigid full weight, heavy-wall steel conduit (RGS) conforming to UL 6 and ANSI C80.1.
2. Intermediate steel conduit (IMC) conforming to UL 1242 and ANSI C80.6.

B. Steel conduit fittings: Cast malleable iron fittings with smooth finish and full threaded hubs. Include steel or malleable iron locknuts, bushings, and other fittings.

1. Insulating bushings: Equal to Thomas & Betts Series 22.

2. Hub fittings with recessed sealing ring and nylon insulated throat equal to Thomas & Betts Series 370.

3. Fittings for exposed locations: Conduit outlet bodies, zinc or cadmium plated.

C. Flexible metal conduit (Type FMC): Made of sheet metal strip, interlocked construction, conforming to UL 1.

D. Liquidtight flexible metal conduit (Type LFMC) shall conform to UL 360.

E. Connectors for flexible metal conduit: Equal to angle wedge "Tite-Bite" with nylon insulated throat, Thomas & Betts Series 3110 and 3130.

F. Liquidtight type connectors: UL 14814A. Fittings: With nylon insulated throat, equal to Thomas & Betts Series 5331.

G. Plastic conduit: Polyvinyl chloride (PVC) Schedule 40, rated for use with 90-degree conductors, for exposed, underground, and encased applications, complying with NEMA Specification TC-2 and UL 651.

H. Plastic conduit fittings and cement:

1. Fittings: Complying with NEMA TC 3 and UL 514.

2. Cement: Solvent cement made by the manufacturer of the conduit and fittings.

I. Wiring troughs: Steel wiring trough with hinged cover, UL listed as wireways and auxiliary gutters, equal to Square D "Square-Duct."

1. Cover: Opening complete width and length of trough;

2. Finish: Baked enamel.

J. Fittings for wiring troughs: Made with removable covers to permit installation of a complete system with access to wires throughout the system, UL listed with the troughs. Connections: Threaded screws at every connector.

K. Weatherproof expansion fittings: With bonding jumpers, equal to O-Z/Gedney types AX and TX.

2.03 ACCESSORY MATERIALS

A. Pull rope: Polypropylene, thickness, tensile strength, and work load selected to meet project load requirements.

B. Caps and plugs: Equal to Thomas & Betts Series 1470.

C. Lubricant: Equal to Ideal Industries, Inc. "Yellow 77". UL approved.

D. Bituminous protective coating: Coal tar based, self-priming on steel, applied in a wet film thickness at least 22.0 mils (559 microns) per coat.

E. Rust inhibitive paint: Alkyd based, equal to Benjamin Moore Super Spec HP D.T.M. Alkyd Low Lustre P23; white, black, or bronzetone; applied in a wet film thickness of at least 2.9 mils.

2.04 FASTENERS

A. General: Select fasteners such that load applied does not exceed one-fourth of manufacturer's load capacity in 3500 psi (24000 kPa) concrete.

B. Fasteners to concrete: Self-drilling type expansion anchors, or machine bolt drop in anchors for drilled holes. Fasteners to concrete ceilings shall be vibration- and shock-resistant.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Provide complete, separate and independent raceway system for each of the various wiring systems including, but not limited to, the following:

1. Lighting and Lighting Controls

B. Wire all raceway systems completely, except where otherwise indicated, as shown on drawings and as required for satisfactory operation of each system.

C. Where wiring troughs are required or used to facilitate the installation, amply size them to accommodate conductors, in accordance with NFPA 70.

D. Types and locations of conduits are scheduled at the end of the section.

E. Do not install conductors or pull rope during installation of conduit.

F. Where conduit is connected to a cabinet, junction box, pull box, or auxiliary gutter, protect the conductors with an insulating bushing. Provide locknuts both inside and outside the enclosure. Where conduit is stubbed up to above ceilings for future wiring, close ends with bushings.

G. Bituminous protective coating:

1. Coat exposed threads on steel conduits in concrete slabs at couplings and fittings, after joints are made up.

2. Coat metallic conduits below grade not in concrete, and where emerging from below grade or slabs, four inches above and below grade or slab.

H. Rust-inhibitive paint:

1. Exposed threads of exterior conduit.

2. All unfinished metal components.

I. Make turns in conduit runs with manufactured elbows or using machines or tools designed to bend conduit. Turns shall be not less than the various radii permitted by NFPA 70.

J. Sizes:

1. Do not use conduit smaller than 1 inch, except where otherwise indicated.

2. Conduit sizes shown on drawings are based on Type THHN/THWN wire.

K. Make vertical runs plumb and horizontal runs level and parallel with building walls and partitions.

L. Ground conduits as required by NFPA 70.

M. Where conduits pass through building expansion joints, and wherever relative movement could occur between adjacent slabs, equip with weatherproof expansion fittings and bonding jumpers.

N. Run conduits concealed in new construction except where connecting to surface-mounted cabinets and equipment, and in electrical and mechanical equipment spaces. Install conduit within walls and partitions.

O. Immediately after each run of conduit is completed, test it for clearance, smooth the joints, and close at each end with caps or plugs to prevent entrance of moisture or debris.

P. Conduit installed outdoors shall provide a liquidtight seal. Use steel or malleable iron hub fittings. Coat exposed threads with bituminous protective coating.

3.02 INSTALLING FLEXIBLE CONDUIT

A. Installation shall comply with NFPA 70.

1. Minimum length: Two feet (610 mm).

2. Maximum length: Six feet (1830 mm).

B. In wet locations, install liquidtight type, in such a manner that liquid tends to run off the surface and not drain toward the fittings.

C. Where fittings are brought into an enclosure with a knockout, install a gasket assembly consisting of an O ring and retainer on the outside.

3.03 INSTALLING PULL ROPE AND CONDUCTORS

A. After conduit is installed, fish pull rope. After completion of the work of this project, pull rope shall remain in conduits identified as to be left empty.

B. Do not use a pull rope that has a tensile strength of more than one of the conductors of a two-wire circuit, more than two of the conductors of a three-wire circuit, or more than three of the conductors of a four-wire circuit.

C. Do not pull conductors into the conduits until the system is entirely completed and wet building materials are dry.

D. Use only a lubricant approved for use with conductor materials and pull rope materials.

3.04 INSTALLING UNDERGROUND CONDUIT, GENERAL

A. Depth:

1. Buried under building slabs: Top of conduit no less than 12 inches below the vapor barrier. Seal around conduits where they penetrate the vapor barrier.

2. Outside building: Top of conduit no less than 24 inches below finish grade.

B. Slope: At least 3 inches in 100 feet away from buildings and toward manholes or other drainage points.

C. Cleaning: At the completion of each run, in each conduit, first run a testing mandrel not less than 12 inches (305 mm) long with diameter 0.25 inch (6.35 mm) less than the inside diameter of the conduit; then draw through a stiff-bristled brush until all particles are removed. Immediately install conduit plugs.

D. Except at conduit risers, make changes in direction of runs, either vertical or horizontal, by long sweep bends. Bend may be made up of one or more curved or straight sections or combinations. Use manufactured bends with a minimum radius of 36 inches.

3.05 INSTALLING UNDERGROUND CONDUIT WITHOUT CONCRETE ENCASEMENT

A. Run conduit in straight lines except as necessary.

B. Trenches: At least three inches (80 mm) clearance on each side of the conduit.

C. Warning tape: Install in backfill approximately 12 inches (300 mm) below grade.

D. Under existing roads and paved areas not to be disturbed, jack rigid steel conduit into place.

3.06 SCHEDULE OF LOCATIONS

A. RGS with screw joint couplings:

1. Conduits in concrete slabs except where noted to be plastic.

2. First five feet of conduit extending outside building.

3. Under roads and paved areas where existing pavement is not to be disturbed, extending at least five feet beyond edges of pavement.

4. Elbows penetrating floor slabs.

B. IMC with screw joint couplings:

1. Conduits 2.0 inch (53-mm) size and larger except as noted above to be rigid steel.

2. Wiring to exterior equipment.

C. Plastic with solvent cement joints:

1. For exterior circuits, directly buried, except first five feet from building.

2. Where noted under concrete slab, concrete encased.

3. Where noted under concrete slab, direct buried.

4. Where noted in concrete slabs.

5. For concrete encased duct banks.

END OF SECTION 260533

SECTION 260534 - BOXES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Boxes with covers.

1.02 RELATED SECTIONS

A. Conduits: Section 260533.

B. Wiring devices: Section 262726.

C. Outlet boxes where required for special systems: Provided by the equipment manufacturers of the various systems.

1.03 SUBMITTALS

A. Product data: Each type of box included in the project.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

B. Boxes:

1. Appleton/EGS Electrical Group
2. RACO/Hubbell Electrical Products
3. Steel City/Thomas & Betts

2.02 MATERIALS

A. Outlet, switch, and junction boxes:

1. Cast-metal, where required for weather-exposed, or exposed locations: NEMA FB 1, ferrous alloy or aluminum, Type FD, with gasketed cover.

2.03 BOXES FOR WALLS AND PARTITIONS

A. Outlet boxes in concrete construction: Octagonal, two-piece type, of sufficient depth to keep conduits not closer than 1 inch (25 mm) to surface.

B. Switch and receptacle boxes in masonry partitions and walls: Square cornered tile wall boxes 3.5 inches (90 mm) deep, or four-inch (100-mm) square boxes with raised tile wall device covers. The device covers shall be of extra depths required to suit the block or brick construction in which they are placed.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Provide box at each outlet, switch, and appurtenance. Each box shall be of a type suitable for the duty intended and shall be installed in accordance with the manufacturer's instructions.

1. Where conduit is weather-exposed or exposed, provide cast-steel or cast-aluminum boxes.

B. Coordinate locations of boxes with installation of conduit as specified in Section 260533.

C. Do not install boxes back-to-back (through the wall) in partitions.

D. Firmly secure the boxes in place, plumb, level, and with front of device cover even with finished wall surface.

E. Provide a single cover plate where two or more devices are grouped together in one box.

F. Outlet boxes in fire-rated assembly:

1. Clearance between boxes and wallboard shall not exceed 0.125 inch (3.2 mm).

2. Surface area of individual outlet box does not exceed 16 square inches (103 sq cm).

3. Entire surface area of boxes shall not exceed 100 square inches (645 sq cm) per 100 square feet (9.3 sq m) of wall surface.

3.02 IDENTIFICATION

A. Identification inside boxes for recess-mounted or concealed in walls and partitions: Plasticized card stock tags marked with permanent waterproof black markers.

1. Power and lighting: Panelboard designation and circuit number(s).

END OF SECTION 260534

SECTION 260544 - UNDERGROUND DUCTS

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes the following:

1. Ducts in directly buried duct banks.

2. Ducts in concrete-encased duct banks.

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):

1. AASHTO-HB 17: Standard Specifications for Highway Bridges. Includes the AASHTO categories for structural loads:
   a. Heavy traffic: HS20.
   b. Medium traffic: HS15.
   c. Light traffic: H10.

B. ASTM International (ASTM)

1. ASTM C 478: Precast Reinforced Concrete Manhole Sections.

2. ASTM C 857: Minimum Structural Design Loading for Underground Precast Concrete Utility Structures. Includes classes which correspond to AASHTO categories:
   a. Heavy traffic: Class A-16.
   b. Medium traffic: Class A-12.
   c. Light traffic: Class A-8.
   d. Walkway: Class A-0.3, 300 lb/sq ft (1465 kg/sq m).

3. ASTM C 858: Specification for Underground Precast Concrete Utility Structures.

C. Society of Cable Telecommunications Engineers (SCTE):

1. SCTE 77: Specification for Underground Enclosure Integrity. Light duty and pedestrian traffic only. Includes Tiers for specific applications, and static vertical wheel load ratings:
   a. Tier 5: Sidewalk applications with a safety factor for occasional nondeliberate vehicular traffic.
   b. Tier 8: Sidewalk applications with a safety factor for nondeliberate vehicular traffic.
   c. Tier 15: Driveway, parking lot, and off-roadway applications subject to occasional nondeliberate heavy vehicular traffic.

1.03 SUBMITTALS

A. Product data: For the following:

1. Precast polymer concrete enclosures.

2. Conduit and ducts, including elbows, bell ends, bends, fittings, and solvent cement.

3. Duct bank materials, including spacers and miscellaneous components.

4. Warning tape.

B. Shop drawings: Show fabrication and installation details for underground ducts and utility structures.

C. Coordination drawings: Show duct profiles and coordination with other utilities and underground structures. Include plans and sections drawn to scale, and show all bends and location of expansion fittings.

1.04 QUALITY ASSURANCE

A. Electrical components, devices, and accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with ANSI C2.

C. Comply with NFPA 70.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver ducts to project site with ends capped. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.

B. Store precast polymer concrete units at project site as recommended by manufacturer to prevent physical damage. Arrange so identification markings are visible.

C. Lift and support precast polymer concrete units only at designated lifting or supporting points.

1.06 PROJECT CONDITIONS

A. Existing utilities: Do not interrupt utilities serving facilities occupied by Project Officer or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated.

1. Notify Project Officer and Landscape Architect at least two days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without Project Officer and Landscape Architect’s written permission.

1.07 COORDINATION

A. Coordinate layout and installation of ducts and handholes with final arrangement of other utilities and site grading, as determined in the field.

B. Coordinate elevations of ducts and duct bank entrances into manholes with final profiles of conduits as determined by coordination with other utilities and underground obstructions. Revise locations and elevations from those indicated as required to suit field conditions and to ensure duct runs drain to manholes, and as approved by Project Officer and Landscape Architect.

1.08 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 - PRODUCTS

2.01 PRODUCTS AND MANUFACTURERS

A. Available manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:

1. Nonmetallic ducts and accessories:
   a. ARNCO Corp.
   b. Beck Manufacturing Inc.
   c. Cantex, Inc.
   d. CertainTeed Corp.; Pipe & Plastics Group.
   e. ElecSys, Inc.
   f. Electri-Flex Co.
   g. IPEX, Inc.
   h. Lamson & Sessions; Carlon Electrical Products.
   i. Manhattan/CDT
   j. Spiraduct/AFC Cable Systems, Inc.

2.02 CONDUIT

A. Conduit and fittings are specified in Section 260533.

2.03 DUCTS

A. Rigid nonmetallic conduit: NEMA TC 2, Type EPC-40-PVC, UL 651, with matching fittings by the same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

B. Rigid nonmetallic conduit: NEMA TC 2, Type EPC-80-PVC, UL 651, with matching fittings by the same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

C. Plastic utilities duct: NEMA TC 6, Type EB-20-PVC, ASTM F 512, UL 651A, with matching fittings by the same manufacturer as the conduit, complying with NEMA TC 9.

D. Reinforced fiberglass epoxy duct: Type FRE, NEMA TC-14A (IPS) medium wall, UL listed and meeting applicable ASTM standards for medium-voltage service.

2.04 ACCESSORIES

A. Duct spacers: Rigid, nonmetallic, horizontally and vertically interlocking spacers, selected to provide minimum duct spacings and cover depths indicated while supporting ducts during concreting and backfilling.

B. Duct-sealing compound: Nonhardening, safe for contact with human skin, not deleterious to cable insulation, and workable at temperatures as low as 35 deg F (2 deg C). Capable of withstanding temperature of 300 deg F (150 deg C) without slump and of adhering to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals.

C. Warning tape: Underground-line warning tape specified in Section 260553, Identification for Electrical Systems.

2.05 CONSTRUCTION MATERIALS

A. Waterproofing: Comply with Division 07 section specifying waterproofing.

B. Mortar: Comply with ASTM C 270, Type M, except for quantities less than 2.0 cu. ft. (60 L) where packaged mix complying with ASTM C 387, Type M, may be used.

C. Concrete: Use 3000-psi- (20.7-MPa-) minimum, 28-day compressive strength and 0.375-inch (10-mm) maximum aggregate size. Concrete and reinforcement are specified in Division 03 Section “Cast-in-Place Concrete.”

PART 3 - EXECUTION

3.01 APPLICATIONS

A. Underground ducts for electrical cables higher than 600 V: Type EPC-40-PVC concrete-encased duct bank.

B. Underground ducts for electrical feeders 600 V and below: Type EB-20-PVC or EPC-40-PVC, concrete-encased duct bank.

C. Underground ducts for electrical branch circuits 600 V and below: Type EPC-40-PVC, directly buried duct bank, except use Type EPC-80-PVC when crossing roads.

3.02 EARTHWORK

A. Excavation and backfill: Comply with Section 260501, Excavation and Fill for Electrical Work, but do not use heavy-duty, hydraulic-operated, compaction equipment.

B. Restore surface features at areas disturbed by excavation and reestablish original grades, unless otherwise indicated. Replace removed sod immediately after backfilling is completed.

C. Restore all areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Division 32 Section specifying Landscaping.

D. Restore disturbed pavement. Refer to “Cutting and Patching” in Section 260101.

3.03 CONDUIT AND DUCT INSTALLATION

A. Slope: Pitch ducts a minimum slope of 1:300 down toward handholes and away from buildings and equipment.

B. Curves and bends: Use manufactured elbows for stub-ups at equipment and at building entrances. Use manufactured long sweep bends with a minimum radius of 25 feet (7.5 m), both horizontally and vertically, at other locations.

C. Use solvent-cement joints in ducts and fittings and make watertight according to manufacturer’s written instructions. Stagger couplings so those of adjacent ducts do not lie in the same plane.

D. Concrete-encased, nonmetallic ducts: Support ducts on duct spacers, spaced as recommended by manufacturer and coordinated with duct size, duct spacing, and outdoor temperature. Install as follows:

1. Separator installation: Space separators close enough to prevent sagging and deforming of ducts and secure separators to earth and to ducts to prevent floating during concreting. Stagger spacers approximately 6 inches (150 mm) between tiers. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.

2. Concreting: Spade concrete carefully during pours to prevent voids under and between conduits and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto ducts. Use a plank to direct concrete down sides of bank assembly to trench bottom. Allow concrete to flow to center of bank and rise up in middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct bank application. Pour each run of envelope between handholes or other terminations in one continuous operation. If more than one pour is necessary, terminate each pour in a vertical plane and install 0.75-inch (19-mm) reinforcing rod dowels extending 18 inches (450 mm) into concrete on both sides of joint near corners of envelope.

3. Reinforcement: Reinforce duct banks where they cross disturbed earth and where indicated.

4. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.

5. Minimum clearances between ducts: 3 inches (75 mm) between ducts and exterior envelope wall, 2 inches (50 mm) between ducts for like services, and 4 inches (100 mm) between power and signal ducts.

6. Depth: Install top of duct bank at least 24 inches (600 mm) below finished grade in nontraffic areas and at least 30 inches (750 mm) below finished grade in vehicular traffic areas, unless otherwise indicated.

E. Directly buried ducts: Support ducts on duct spacers, spaced as recommended by manufacturer and coordinated with duct size, duct spacing, and outdoor temperature. Install as follows:

1. Separator installation: Space separators close enough to prevent sagging and deforming of ducts.

2. Install expansion fittings as shown on shop drawings.

3. Trench bottom: Continuous, firm, and uniform support for duct bank. Prepare trench bottoms as specified in 260501, Excavation and Fill for Electrical Work.

4. Backfill: Install backfill as specified in Section 260501, Excavation and Fill for Electrical Work. After installing first tier of ducts, backfill and compact. Repeat backfilling after placing each tier. After placing last tier, hand-place backfill to 4 inches (100 mm) over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, complete backfilling normally.

5. Minimum clearances between ducts: 3 inches (75 mm) between ducts for like services and 6 inches (150 mm) between power and signal ducts.

6. Depth: Install top of duct bank at least 24 inches (600 mm) below finished grade, unless otherwise indicated.

F. Warning tape: Bury warning tape approximately 12 inches (300 mm) above all concrete-encased duct banks. Align tape parallel to and within 3 inches (75 mm) of the centerline of duct bank.

G. Stub-ups: Use rigid steel conduit for stub-ups to equipment. For equipment mounted on outdoor concrete bases, extend steel conduit a minimum of 5 feet (1.5 m) from edge of base. Install insulated grounding bushings on terminations. Couple steel conduits to ducts with adapters designed for this purpose and encase coupling with 3 inches (75 mm) of concrete.

H. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15-psig (1.03-MPa) hydrostatic pressure.

I. Pulling cord: Install 100-lbf- (445-N-) test nylon cord in ducts, including spares.

3.04 FIELD QUALITY CONTROL

A. Testing: Demonstrate capability and compliance with requirements on completion of installation of underground ducts and utility structures.

B. Duct integrity: Pull aluminum or wood test mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80 percent fill of the duct. If obstructions are indicated, remove obstructions and retest.

C. Correct installations if possible and retest to demonstrate compliance. Remove and replace defective products and retest.

3.05 CLEANING

A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

END OF SECTION 260544

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Time-based control devices.

B. Lighting contactors.

1.02 SUBMITTALS

A. Product data: Each type of device used in the project.

B. Samples: Each type of switch, sensor, and device plate, if requested by Landscape Architect.

C. Field quality control test reports.

D. Qualifications of testing agency.

1.03 QUALITY ASSURANCE

A. All devices shall be UL listed for their intended application.

PART 2 - PRODUCTS

2.01 TIME-BASED CONTROL DEVICES

A. Digital timeclock: Equal to TORK, EWZ Series, electronic 365-day microprocessor-based, solid-state, two-channel control, with 24-hour programming capability and feature to provide automatic tracking of sunrise and sunset times in order to automatically turn lights On at dusk and Off at dawn, selectable to channel.

1. Provide one additional On and Off event per channel as well as selectable daylight savings time adjustment and automatic leap year correction.

2. Include Skip-A-Day, Offset to sunrise and sunset, and Manual Override, independently programmable for each channel.

3. Latitude: Adjustable from 10 to 60 degrees northern or southern hemisphere.

4. Clock format: Selectable for 12 (AM/PM) or 24 hours.

5. Unit shall be capable of operating during a power outage for 275 hours with a lithium battery.

6. The control shall provide a one-second contact closure for pulsing mechanical contactor or latching relay at dusk (or On event). Provide a one-second contact closure on the second output for unlatching the contactor (relay) at dawn (or programmed Off time).

7. The control shall be DIN rail or surface mountable.
   a. Unit shall be surface-mounted in a NEMA 250 Type 3R enclosure.

2.02 LIGHTING CONTACTORS

A. Lighting contactors: Equal to Square D 8903, UL 508 listed, in NEMA 250 Type 1 enclosure, mechanically held, electrically operated, enclosed silver-alloy double-break contacts, coil-clearing contacts; withstand rating as indicated on the drawings; Hand/Off/Auto selector switch on cover.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Install devices in complete compliance with the manufacturer's recommendations.

B. Provide a single cover plate where two or more devices are grouped together in one box.

C. Fully document all control device calibration settings after system programming with manufacturer's representative and submit this information as a part of the O&M manual.

3.02 FIELD QUALITY CONTROL

A. Functional testing. Perform tests and prepare test reports for the following:

1. Control systems shall be tested to ensure that control hardware and software are calibrated, adjusted, programmed, and in proper working condition in accordance with the contract documents and manufacturer's installation instructions.

2. For time switches and programmable schedule controls, confirm settings are programmed to turn the lights off. Document the settings of these devices.

END OF SECTION 260923

SECTION 262716 - CABINETS AND ENCLOSURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Weatherproof enclosures.

1.02 SUBMITTALS

A. Product data: Each type of enclosure required for the project.

PART 2 - PRODUCTS

2.01 WEATHERPROOF ENCLOSURES

A. Type 3R in accordance with NEMA 250 and conforming to UL 57, of size required by NEC to fit equipment or as shown on the drawings.

B. Construction: Fabricated of 14-gage galvanized steel, with drip shield top and smooth, seam-free sides and back.

C. Doors: Double doors fabricated from 12-gage galvanized steel, overlap type without center post.

1. Door gaskets: Neoprene, attached with oil-resistant adhesive and held in place with steel retaining strips.

2. Full-length piano hinges.

3. Locks: Keyed, with all keys alike. Provide two keys with each enclosure.

D. Provide steel channels in rear of cabinet for mounting metering equipment.

2.02 FINISHES

A. Satin gray enamel, inside and out.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Securely attach enclosure to frame, set on housekeeping pad, as indicated.

3.02 LOCATIONS

A. Provide weatherproof type in exterior locations.

END OF SECTION 262716

SECTION 262800 - ENCLOSED CIRCUIT PROTECTIVE DEVICES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Enclosed circuit breakers.

1.02 REFERENCES

A. NEMA AB 1: Molded Case Circuit Breakers and Molded Case Switches.

B. NEMA KS 1: Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

C. UL 98: Enclosed and Dead-Front Switches.

D. UL 489: Molded Case Circuit Breakers and Circuit Breaker Enclosures.

1.03 SUBMITTALS

A. Product data: Each type of enclosed circuit breaker.

1.04 QUALITY ASSURANCE

A. Comply with the following standards:

1. UL 98.

2. UL 198E.

3. UL 489 for enclosed circuit breakers.

B. UL label and local testing (if required): As specified in Section 260500, Common Work Results for Electrical.

PART 2 - PRODUCTS

2.01 ENCLOSED CIRCUIT BREAKERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Corporation.

2. General Electric Company.

3. Schneider Electric; Square D products.

4. Siemens Industry, Inc.

B. Separately enclosed circuit breakers, as indicated, manually operated, trip-free from the handle, and provided with inverse-time, thermal-element overload protection and instantaneous magnetic short-circuit protection on all poles.

C. Breaker sizes, calibrations and interrupting capacity: Noted on the drawings. Breakers shall be calibrated for 50 degrees C ambient and shall be rated for use with minimum 75 degree C wire.

D. Type: Molded-case, NEMA AB 1.

E. Operating handles shall clearly indicate the positions On, Trip, and Off.

F. Unit shall be UL listed for service entrance.

G. Enclosures: Indoors NEMA 250 Type 1; outdoors Type 3R with raintight hubs.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Securely attach and properly connect enclosed circuit breakers.

END OF SECTION 262800

SECTION 265600 - EXTERIOR LIGHTING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Fixtures

1.02 RELATED SECTIONS

A. Conduits: Section 260533.

B. Wires and cables: Section 260519.

C. Excavation and fill for electrical work: Section 260501.

1.03 DEFINITIONS

A. Luminaire: A lighting device consisting of a light source together with its direct appurtenances, including globe, reflector, refractor, housing, and such support as is integral with the housing. The standard and the bracket are not part of the luminaire.

1.04 SUBMITTALS

A. Product data: Submit for each type of fixture, pole and standard.

1. Type
2. Wattage
3. Voltage
4. Efficiency
5. Suspension
6. Glassware
7. Finished diameters
8. Mounting heights
9. Lamps
10. LED drivers
11. Appurtenances

B. Shop drawings shall show complete dimensions of complete assembled unit with accessories. Include wiring diagrams, showing clearly manufacturer-installed and field-installed wiring.

C. Samples: If contractor has selected fixtures not identical to scheduled fixtures, as permitted in Part 2 below as an option, Landscape Architect may require submittal of samples.

1. One complete fixture of each approved type, except as otherwise instructed by the Landscape Architect.

2. Install approved samples as work of the project, in locations as directed, as standards for all fixtures of the same type.

3. If substitute fixtures should be requested, submit samples as required.

4. For selection, manufacturer's complete line of colors and textures.

1.05 QUALITY ASSURANCE

A. UL label and local testing (if required): As specified in Section 260500, Common Work Results for Electrical.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver glassware and lamps in their original cartons, clearly labeled.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-design products: Fixtures indicated in the Fixture Schedule on the drawings and at the end of this section are the basis of design of the project.

1. Subject to compliance with requirements, provide the scheduled products. Unnamed products will only be considered and approved according to bidding and Contracting requirements and Division 01 requirements for substitutions.

B. Subject to compliance with requirements, provide products by one of the following:

1. LED drivers:
   a. EldoLED
   b. Lutron
   c. Osram Sylvania
   d. Philips/Advance
   e. Universal Lighting Technologies

2. Lamps:
   a. General Electric
   b. Osram Sylvania
   c. Philips
   d. Venture

2.02 CONCRETE

A. Concrete shall be 3,000 psi strength.

2.03 EXTERIOR LIGHTING FIXTURES

A. Provide lighting fixtures of sizes, types, and ratings scheduled, complete with, but not limited to, housings, energy-efficient ballasts, starters, and wiring.

2.04 LED DRIVERS

A. Driver shall operate from a 120-volt or 277-volt, 60-Hz input power source and be suitable for outputting power to 12-volt or 24-volt LED lamp sources, as required.

B. Drivers, where specified, shall be capable of being dimmed. Dimmable drivers shall be controlled by a Class 2 low-voltage 0-10VDC controller.

C. Performance criteria:

1. Driver shall have a Class A sound rating.

2. Driver shall have a power factor (PF) greater than 0.90.

3. Driver shall have Total Harmonic Distortion (THD) of input current equal to or less than 20 percent.

D. Driver shall meet FCC and Title 47 CFR regulations for EMI/RFI.

E. Driver shall comply with ANSI C62.41 Class A requirements for transient protection.

F. Driver shall have minimum operating ambient temperature range of -20 degrees C to 50 degrees C.

2.05 LAMPS

A. Lamps, LED:

1. The LED manufacturer shall provide the quantity and wattage of LEDs required to achieve the defined lighting output set forth by the lighting fixture manufacturer.

2. LED lamps shall be integrated into an engineered package for the specific lighting fixture application, including heat dissipation components.

3. Color temperature: As specified in lighting fixture schedule, with a tolerance of plus or minus 100K and within a range of three macadam ellipses. Noticeable color temperature variations between adjacent lighting fixtures shall be considered a failure to meet these specifications and shall be replaced at no cost to the Project Officer.

4. Minimum performance characteristics:
   a. Life: Minimum lumen maintenance of L70 at 50,000 hours, as defined by IES LM-80.
   b. Lumen output: Based on absolute photometry, lumens (total luminous flux exiting the physical luminaire), as specified on contract drawings and schedules.
   c. Color rendering index: Rated at 85 or higher.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Install poles, accessories, and fixtures as indicated, in accordance with manufacturer's written instructions, applicable requirements of NFPA 70, NESC and NEMA standards, and with recognized industry practices.

3.02 GROUNDING

A. Provide equipment grounding connections for exterior lighting fixtures as indicated, and in accordance with Section 260526, Grounding and Bonding. Tighten connections to comply with tightening torques specified in UL 486A.

3.03 FIELD QUALITY CONTROL

A. At the date of substantial completion, replace lamps in exterior lighting fixtures which are observed to be noticeably dimmed after Contractor's use and testing, as judged by the Landscape Architect.

3.04 ADJUSTING AND CLEANING

A. Aim adjustable lighting fixtures and lamps in night test of system. Verify that measured illuminance values comply with approved photometric diagram.

B. Clean lighting fixtures of dirt and debris upon completion of installation.

C. Protect installed fixtures from damage during construction period.

3.05 DEMONSTRATION

A. Upon completion of installation of exterior lighting fixtures, and associated electrical supply circuitry, apply electrical energy to circuitry to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.

END OF SECTION 265600

DIVISION 31

SECTION 311000 - SITE CLEARING, PREPARATION, DEMOLITION, AND REMOVALS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Cleaning site of debris, grass, trees, and other plant life in preparation for site or building earthwork and removing above-grade items.

2. Protection of existing structures, trees, or vegetation indicated on the Construction Drawings to remain.

3. Application of temporary measures throughout the life of the project to control erosion and siltation associated with any activity related to the construction of this project.

4. Stripping topsoil and stockpiling from areas that are to be incorporated into limits of project and where so indicated on Construction Drawings.

5. Demolition of existing pavement no longer needed, abandoned utilities, and structures, which interfere with proposed construction.

6. Disconnecting and capping or sealing site utilities.

B. Provide all labor, materials, tools and equipment to clear and grub all areas identified on the approved plans.

C. Related Sections:

1. 310000 – Earth Moving

2. 312500 – Temporary Erosion and Sediment Control

3. 331116 – Water Distribution

D. In addition to the specifications contained herein, Work shall be performed in accordance with the following:

1. Virginia Erosion and Sedimentation Control Handbook, Latest Edition

2. Underground Utility Protection Ordinance – Chapter 55 Arlington County Code

3. Arlington County Erosion and Sediment Control Ordinance – Chapter 57 Arlington County Code

4. Arlington County Department of Environmental Services (DES) Construction Standards and Specifications

5. Tree Protection Standards and Fencing Requirements – as contained in Arlington County Landscape Standards http://parks.arlingtonva.us/design-standards/ and in Section 311300.

1.02 ENVIRONMENTAL REQUIREMENTS

A. Construct temporary erosion control systems as shown on Construction Drawings and in accordance with applicable County requirements to protect adjacent properties and water resources from erosion and sedimentation.

B. Contractor shall not begin construction without a "Land Disturbing Activity (LDA) Permit" issued by Arlington County DES.

C. Contractor shall be totally responsible for conducting storm water management practices in accordance with LDA and for enforcement action taken or imposed by Federal or State agencies, including cost of fines, construction delays, and remedial actions resulting from Contractor's failure to comply with provisions of LDA permit.

1.03 SUBMITTALS

A. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by demolition operations.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with governing EPA notification regulations before starting demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.05 PROJECT CONDITIONS

A. Conditions existing at time of inspection for bidding purposes will be maintained by the County in so far as practical.

B. Variations to conditions or discrepancy in actual conditions as they apply to site preparation operations are to be brought to attention of the County prior to commencement of site work.

C. Temporary storage of removed items or materials on-site will not be allowed without prior approval from DPR. Carefully remove items indicated by the Project Officer to be salvaged and store on Owner's premises as determined at Pre-Construction meeting.

1.06 MATERIAL OWNERSHIP

A. Except for stripped topsoil, items identified by the Project Officer salvage, or other materials indicated to remain on Owner's Property, cleared materials shall become the Contractor's property and shall be removed from the site.

PART 2 - PRODUCTS

2.01 EQUIPMENT

A. Off-site materials shall be transported to project and on-site materials transported from the project using well-maintained and operating vehicles. Once on site, transporting vehicles shall stay on designated haul roads and shall at no time endanger improvements.

2.02 SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section "Earthwork."

1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

2.03 CONSTRUCTION FENCE

A. Fabric: Fabric shall be 9 Ga., galvanized steel wire woven into 2-inch diamond mesh, knuckled at the bottom and barbed at the top.

B. Line Posts: Line posts shall be 2 ½ inch O.D. galvanized steel, standard weight pipe conforming to F 1083, schedule 40, weighing 3.65 pounds per linear foot.

C. Terminal Posts: Terminal posts shall be 3" inch O.D. galvanized steel, standard weight pipe conforming to ASTM F1083 schedule 40, weighing 5.79 pounds per linear foot.

D. Braces: Braces shall be 1 5/8" inch O.D. galvanized steel, standard weight pipe conforming to ASTM F 1083, schedule 40, weighing 2.27 pounds per linear foot. Trusses shall be 5/16" diameter adjustable truss rods.

E. Top and Bottom Tension Wire: Wire shall be No. 6-gauge galvanized wire.

F. Fittings and Hardware: Hardware, fittings and post caps shall be ductile iron, cast steel or pressed steel, all hot dipped galvanized.

G. Gates: A gate of similar construction as the fence shall be provided with locks. Gates shall be placed at locations as shown on the plans or as required by the Contractor / Owner and approved by the Project Officer. The Project Officer shall be supplied with a set of keys, one (1) key for every lock.

PART 3 - EXECUTION

3.01 PREPARATION

A. Identify existing plant life that is to remain and verify clearing limits are clearly tagged, identified, and marked in such manner as to ensure their safety throughout construction operations. Limits of clearing and grading shall be staked and approved by Project Officer before commencing work. Install Tree Protection Fence (TPF) according to Arlington County Specifications around trees to be preserved and as shown on the construction drawings.

B. No grading operations will be allowed until temporary sediment and erosion control measures have been installed in accordance with the approved plan conforming to the requirements of Arlington County Erosion and Sediment Control Ordinance. No work, storage of materials or parking of vehicles/ equipment shall occur within designated tree protection areas.

C. Erosion and Sediment Control measures shall be periodically cleaned of sediment and maintained. Immediately after every rain storm, all control measures shall be inspected and any deficiencies corrected by the Contractor.

D. No measurement will be made for temporary erosion controls required to correct conditions created due to the Contractor's negligence, carelessness, or failure to install controls in accordance with the approved plan and sequence for the performance of such work.

E. In the even the Contractor repeatedly fails to satisfactorily control erosion and sedimentation, the Owner reserves the right to employ outside assistance or to use its own forces to provide the corrective measures indicated; the cost of such work, plus engineering costs, will be deducted from the monies due to the Contractor for other work.

F. 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 Project Officer and authorities having jurisdiction.

2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

G. Utility Locator Service: Notify Miss Utility for utility location services 72 hours prior to site clearing.

3.02 PROTECTION

A. Locate and identify existing utilities that are to remain and protect these from damage.

B. Following Arlington County Specifications/ Guidelines for Tree Protection Fencing, protect trees, plant growth, and features designated to remain as part of final landscaping. Refer to actual bed drawings for tree protection fencing and signage, and drawing references as contained by Arlington County Landscape Standards.

C. Trees damaged by construction operations shall be evaluated by the Urban Forester and replaced or pruned and treated as needed by an International Society of Arborculture (I.S.A.) Certified Arborist.

D. According to Arlington County's Tree Replacement Guidelines, replace trees damaged beyond repair by the construction process with nursery grown stock meeting American Nursery and Landscape Association (ANLA) Standards.

E. Conduct demolition and removal operations with minimum interference to public or private accesses and facilities. Maintain ingress and egress at all times and clean or sweep roadways daily as required by Erosion Control Plan or governing authority. Dust control shall be provided with sprinkling systems or equipment provided by Contractor.

F. Conduct demolition and removal operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from County.

G. Conduct demolition and removal operations to prevent injury to people and damage to facilities to remain. Ensure safe passage of people around demolition area. Protect existing site improvements, appurtenances, and landscaping to remain.

H. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed it shall be referenced by licensed land surveyor and replaced, as necessary, by same.

I. Provide traffic control as required, in accordance with the US Department of Transportation's "Manual of Uniform Traffic Control Devices" and applicable state highway department requirements.

3.03 DEMOLITION:

A. Asphalt pavement, brick pavers and concrete curb & gutter designated for demolition shall be broken into pieces and disposed of at an offsite location selected by the Contractor.

3.04 CLEARING AND GRUBBING

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

B. Unless otherwise indicated on Construction Drawings, remove trees, shrubs, grass, other vegetation, improvements, or obstructions interfering with installation of new construction. Removal includes digging out stumps and roots. Depressions caused by clearing and grubbing operations are to be filled to subgrade elevation to avoid ponding water.

C. The area of grubbing shall be maintained within the clearing limits shown on the plans. Remove stumps and root matter to a depth of 24 inches below existing ground surface. Refill excavations made by removal of stumps or roots with materials specified for structural backfill in Section 312000.

D. Remove grass, trees, plant life, stumps, and other construction debris from site to a legal dump site that is suitable for handling such material according to state laws and regulations.

3.05 TOPSOIL EXCAVATION

A. Topsoil shall consist of organic surficial soil found in depth of not more than 6-inches. Satisfactory topsoil shall be reasonably free of subsoil, clay lumps, stones and other objects over 1 inch in diameter, weeds, roots, and other objectionable material.

B. Cut heavy growths of grass from areas before stripping and remove cuttings with remainder of cleared vegetative material.

C. Strip topsoil from areas that are to be filled, excavated, landscaped, or re-graded to such depth that it prevents intermingling with underlying subsoil or questionable material.

D. Stockpile topsoil in storage piles in areas shown on Construction Drawings or where directed by Project Officer. Construct storage piles to freely drain surface water. Cover storage piles as required to prevent windblown dust. Dispose of unsuitable topsoil as specified by waste material, unless otherwise specified by Project Officer. Excess topsoil shall be removed from site by Contractor unless specifically noted otherwise on Construction Drawings or as acceptable to Project Officer.

3.06 DISPOSAL

A. Dispose of trees and shrubs in accordance with the Garbage, Refuse and Weeds Ordinance of the Arlington County Code. When approved by the Project Officer, material to be dumped within the Contract area where directed.

B. Do not burn materials on the site.

C. Remove material from the site as it accumulates. Do not allow waste material to accumulate for more than 72 hours and should be removed before non-work days.

D. Transport demolition materials off County property and legally dispose of them.

PART 4 – MEASUREMENT AND PAYMENT

4.01 For performing the work of SITE CLEARING, DEMOLITION AND REMOVALS in accordance with the plans, specifications and directions of the Project Officer, the Contractor shall receive the LUMP SUM price bid.

4.02 The price bid shall be a LUMP SUM of Site Clearing, Demolition, and Removals and shall include storage and re-installation of relocated items the cost of all labor, materials, equipment and incidental expenses necessary to complete the work in accordance with the plans and specifications, to the satisfaction of the Project Officer.

END OF SECTION 311000

SECTION 311300 - TREE PROTECTION & ROOT PRUNING

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Protection of existing trees to remain:

a. Hand demolition of existing site infrastructure, hardscape, softscape, walls.
b. Tree Trunk & Limb Protection Wrap
c. Root Pruning of existing trees roots that are affected by execution of the Work, whether temporary or permanent construction.
d. Temporary Root Protection Matting
e. Tree Protection Fencing

B. Provide all labor, materials, tools and equipment as required to have tree protection applied on all areas called for on plans.

C. In addition to the specifications contained herein, Work shall be performed in accordance with the Arlington County Department of Parks & Recreation Design Standards for Tree Protection and Trimming as shown on plans and available online at:

http://parks.arlingtonva.us/design-standards/

D. Related Sections:

a. 311000 Site Clearing, Preparation, Demolition and Removals
b. 312000 Earth Moving
c. 312500 Temporary Erosion and Sediment Control
d. 329100 Planting Preparation
e. 329200 Seeding and Sodding
f. 329300 Exterior Plants

1.02 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Imported Topsoil: Soil obtained off-site that meets the specifications herein for topsoil and is suitable for use in planting soil/backfill soil mixture when existing soil quantities are insufficient. Refer to Section 329100 “Planting Preparation.”

C. Planting Soil/Backfill Soil Mixture: Existing soil modified as specified to be suitable for planting. Refer to Section 329100 “Planting Preparation.”

D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

E. ISA: International Society of Arboriculture

F. CBAY: Chesapeake Bay, typically referring to CBAY watershed.

G. Urban Forester/County Urban Forester: Refers to the Arlington County Urban Forester

H. Landscape Architect: Refers to an Arlington County Landscape Architect or their designee.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated in Section 2.0

A. Certification: From Contractor's 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.

B. Maintenance Requirements: From Contractor's arborist, for care and protection of trees affected by construction during and after completing the Work.

C. Contract arborist Qualifications: Contractor shall submit a copy of valid ISA certification to the Project Officer for approval with confirmation by Urban Forester.

D. List products to be used and firms, including qualifications to perform work.

E. Provide schedules for performance of work.

1.04 QUALITY ASSURANCE

A. Contractor shall ensure that tree and plant protection methods are implemented by an arborist Certified by the International Society of Arboriculture (ISA) to provide for the care of the trees and plants impacted by construction activities. Provide ISA certification verification to Project Officer per section 1.03 "Submittals" prior to beginning work.

B. The Contractor shall identify to the Project Officer at least one authorized on-site Point of Contact(POC) who is, by training or experience, familiar with the policies, regulations and standards applicable to the work being performed. The POC and the certified arborist may be the same individual.

C. Crews shall be directly supervised by an ISA certified arborist.

D. All workers, through related training and on the job experience, shall be familiar with the technical aspects of arboricultural work and equipment used in such operations.

E. Trucks and mechanized equipment shall not enter tree protection areas.

F. Stump grinding shall be with small machines specifically designed for that purposes. No stumps shall be excavated except as described herein. Stumps shall be ground not more than 8" below grade and care must be taken to minimize damage to root of the trees to remain.

G. No stump grinding within tree protection areas.

H. All work in or near tree protection areas shall be carefully performed by Contractor to avoid damage to tree trunks, branches, root system, and other existing plant materials and soils that are to remain.

I. Silt shall not be allowed to collect in preservation or reforestation areas. Silt accumulating in preservation areas shall constitute damage and will require remedial activity. All silt shall be removed from preservation areas within 24 hours of siltation. The methods and procedures for silt removal within tree preservation and reforested areas shall be approved by the Project Officer with confirmation by the Urban Forester.

J. Tree Pruning Standard: Comply with ANSI A300 (Part 1), "Tree, Shrub, and Other Woody Plant Maintenance--Standard Practices (Pruning)."

   a. Pruning shall remove only dead, dying, damaged or broken limbs greater than 1" – 1.5" in diameter.

   b. Pruning for clearance shall be reviewed and approved by Project Officer with confirmation by the Urban Forester.

K. Urban Forester Notification: The Contractor shall notify the Project Officer 72 hours prior to the following events, so that the County's Urban Forester can be notified and present at a pre-construction site meeting (refer to Section 3) and to observe work:

   a. Tree protection fencing installation
   b. Tree or root-pruning operations.

   c. Work within tree protection zones.

   d. Tree planting.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Temporary Tree Protection Fence: Unless otherwise indicated in approved plans, tree protection fence shall be two-inch wire mesh fabric measuring 72 inches in height mounted on 1.9" O.D. steel pipes driven 24 inches into the ground, placed 120 inches on-center maximum. Refer to Arlington County DPR standard detail on approved plans.

B. Tree Protection Signs: Shall be of heavy-duty sheet aluminum or weatherproof plastic material measuring 12 inches by 18 inches. Signs shall state "NO ENTRY, TREE PROTECTION AREA, CALL 703-228-6557 TO REPORT VIOLATIONS" in both English and Spanish. Signs shall be mounted on fence every 50 feet maximum.

C. Topsoil: Refer to Section 329100 – Plant Preparation.

D. Bark Mulch: Refer to Section 329100 –Plant Preparation

E. Temporary Root Protection Matting: If required in approved plans, temporary root protection matting shall be a double-sided geocomposite, geonet core, non-wove covering such as Tendrain 770-2, as manufactured by Tenax Corporation, Baltimore, MD or approved equal. Six (6) inches of wood chip mulch shall be applied to area to receive root protection matting prior to installation. Matting shall be installed in a single layer.

F. Landscape nails: When required, spikes shall be 12” as indicated on the drawings.

PART 3- EXECUTION

3.01 PREPARATION

A. Prior to the construction activities, the Contractor shall meet on-site with the Project Officer and Urban Forester to review trees to remain and protective measures required.

B. Temporary Tree Protection Fencing: Install temporary tree protection fencing and signs around tree protection zones to protect remaining trees and vegetation from construction damage. Maintain temporary fence and remove when construction is complete after approval by Project Officer with confirmation by the County Urban Forester.

C. 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.

D. No personnel, vehicles, equipment, construction materials, or construction debris shall be allowed inside the tree protection areas at any time during construction without the written consent of the Project Officer with confirmation by the Urban Forester. If a violation is observed, the Contractor will be notified by the Project Officer and shall immediately rectify the situation. Continued and subsequent violations will result in a fine of $500 per day of violation.

E. Special Demolition Procedures:

a. Demolition of walks and hardscape within tree protection areas shall be directly supervised by an ISA certified arborist.

b. Mechanized equipment shall not enter tree protection areas (TPAs) or reforestation areas.

c. Backfill of voids created by demolition within the TPAs and reforestation areas shall be loosely placed topsoil. Only the amount of topsoil necessary to fill the void without spreading over existing grades shall be allowed.

3.02 EXCAVATION

A. Install shoring or other protective support systems to minimize sloping or benching of excavations if indicated in the approved plans.

B. Do not excavate within tree protection zones, unless otherwise indicated.

C. Where utility trenches are required within tree protection zones, Contractor shall perform root pruning prior to trenching.

D. Where excavation is proposed within the critical root zone of trees to remain, Contractor shall perform root pruning as indicated in approved plans prior to excavation.

E. Where new finish grade is indicated below existing grade around trees, Contractor shall slope grade outside of tree protection zones. Maintain existing grades within tree protection zones.

3.3 ROOT PRUNING:

A. When required, root pruning locations will be indicated on the approved plans. Exact location and depth shall be determined on site with Project Officer and Urban Forester during the pre-construction meeting.

B. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots with clean, sharp pruning instruments; do not break or chop. All root pruning shall be performed by an ISA certified arborist. Refer to Arlington County Department of Parks & Recreation Design Standards "Tree Protection and Trimming" as shown on plans and available online at:

http://parks.arlingtonva.us/design-standards/

3.4 TREE REPAIR AND REPLACEMENT

A. Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs, and roots according to Arlington County Urban Forester or contract arborist's written instructions.

B. The Contractor shall be responsible for any damage to trees within the Tree Protection Area caused by the Contractor's personnel, vehicles, or equipment at the site. Any damage to a tree to remain shall result in a payment by the Contractor to the Project Officer for the amount of damage based on the latest edition of the Council of Tree and Landscape Appraisers Guide for Plant Appraisal published by the International Society of Arboriculture (ISA). All trees are to be valued as landscape trees.

3.5 DISPOSAL OF WASTE MATERIALS

A. Burning is not permitted.

B. Disposal: Remove excess excavated material and displaced trees from Owner's property and legally dispose.

PART 4 – MEASUREMENT

4.01 The measurement of TRUNK/LIMB PROTECTION WRAP shall be the number of EACH constructed, including, but not limited to, all labor, materials, equipment, and incidental expenses necessary to complete the work in accordance with the plans and specifications to the satisfaction of the Project Officer.

4.02 The measurement of ROOT PRUNING shall be the number of LINEAR FEET constructed, including, but not limited to, all labor, materials, equipment, and incidental expenses necessary to complete the work in accordance with the plans and specifications to the satisfaction of the Project Officer.

4.03 The measurement of ROOT PROTECTION MATTING shall be the number of SQUARE FEET constructed, including, but not limited to, all labor, materials, equipment, and incidental expenses necessary to complete the work in accordance with the plans and specifications to the satisfaction of the Project Officer.

END OF SECTION 311300

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Preparing subgrades for walks, pavements, lawns and grasses, and exterior plants.
2. Excavating and backfilling for structures.
3. Subbase course for concrete walks and pavements.
4. Subsurface drainage backfill for trenches.
5. Excavating and backfilling for utility trenches.

B. Provide all labor, materials, tools and equipment to clear and grub all areas identified on the approved plans.

C. Related Sections:

1. Section 129300 – Site Furnishings
2. Section 311000 – Site Clearings, Preparations, Demolition and Removals
3. Section 311300 – Tree Protection and Root Pruning
4. Section 321216 – Asphalt Pavement
5. Section 321313 – Cement Concrete Pavement
6. Section 329300 – Exterior Plants
7. Section 329200 – Seeding and Sodding
8. Section 329100 – Planting Preparation

1.02 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. 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 Project Officer Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.

3. Unauthorized Excavation: Excavation below subgrade elevation or beyond indicated lines and dimensions without direction by Project Officer Unauthorized excavation, as well as remedial work directed by Project Officer shall be without additional compensation.

F. Fill: Soil materials used to raise existing grades.

G. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Equipment for Footing, Trench, and Pit Excavation: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- wide, maximum width, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,090 lbf and stick-crowd force of not less than 18,400 lbf extra-long reach boom.

2. Equipment for bulk excavation: Late-model, track-mounted loader; rated at not less than 230 hp flywheel power and developing a minimum of 47,992-lbf breakout force with a general-purpose bare bucket.

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 course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.03 SUBMITTALS

A. Product Data: for the following:

1. Controlled low-strength material, including design mixture.

C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.

2. Laboratory compaction curve according to ASTM D 698 for each on-site and borrow soil material proposed for fill and backfill.

D. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

1.04 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: The County shall engage an independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock- definition testing, as documented according to ASTM D 3740 and ASTM E 548. The Contractor shall coordinate directly with testing agency.

1.05 PROJECT CONDITIONS

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

1. Notify Project Officer not less than two days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without Project Officer's written permission.

3. Contact utility-locator service for area where Project is located before excavating.

B. Protect all exiting pipes, poles, wires, fences, trees, and landscape plant materials, and other structures that are to remain in place. In case of damage, notify the appropriate agency to affect repair in a manner resulting in a condition at least equal to the condition prior to damage.

C. Excavations near existing structures shall not be closer than the distance from finished grade to the bottom of the foundation without sheeting and shoring to protect the existing structure.

D. On paved surfaces, do not use or operate tractors, bulldozers, or other power-operated equipment, the treads or wheels of which are so shaped as to cut or otherwise damage such surfaces. Placing mats or using other methods of protection may be allowed subject to the approval of the Project Officer. Promptly restore all surfaces which have been damaged to a condition at least equal to that in which they are found immediately prior to the beginning of operations. Suitable materials and methods shall be used for such restoration.

E. The Contractor shall be solely responsible for the stability of excavations and meeting of all State and Federal OSHA requirements. Provide all sheathing, lagging, bracing, and other support required to retain the stability of excavations.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups CL, ML, SC, GC, GW, GP, GM, SW, SP, and SM, or a combination of these groups; free of rock or gravel larger than 4 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups 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 crushed stone, slag, and natural or crushed sand; with or without soil motor.

E. Base Course: designated as Type I or Type II as follows: Type I shall consist of crushed stone, crushed slag, or crushed gravel with or without soil mortar or other admixtures. Crushed gravel shall consist of particles of which at least 90 percent by weight of the material retained on the No. 10 sieve shall have at least one face fractures by artificial crushing. Type II shall consist of gravel, stone or slag screenings; fine aggregate and crushed coarse aggregate; sand-clay-soil mortar or other admixtures.

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

G. Bedding Course: Crushed stone Virginia Department of Transportation (VDOT) size 57, 68, or 78 in accordance with VDOT Specification section 203 Table II-5.

2.02 ACCESSORIES

A. Warning Tape: Acid-and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:

B. Detectable Warning Tape: Acid-and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide 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

3.01 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Preparations of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface as specified in section 311000 Site Clearing, Preparation, Demolition and Removals and 311300 Tree Protection and Root Pruning.

C. Protect and maintain erosion and sedimentation controls, which are specified in section 312500 Temporary Erosion and Sediment Control Site Preparation and 311300 Tree Protection and Root Pruning, during earthwork operations.

D. Provide protective insulating materials to protect to protect subgrades and foundations soils against freezing temperatures or frost.

3.02 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.

2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.03 EXPLOSIVES:

A. Explosives: Use of explosives is prohibited.

3.04 EXCAVATION, GENERAL

A. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by the Geotech. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract time may be authorized for rock excavation.

1. Earth Excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.

2. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.

3. Rock Excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations 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.

3.05 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. Pile Foundations: Stop excavations 6 to 12 above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.

3. Excavation for Underground Tanks, Basins, and Mechanical or 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.

3.06 EXCAVATION FOR WALKS AND PAVEMENTS

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

3.07 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Retain, revise, or delete subparagraph below to suit Project.

1. Clearance: As indicated on details.

C. Trench Bottoms: Excavate trenches deeper than bottom of pipe elevation to allow for bedding course.

1. Width and Depth: As indicated on details.

3.08 SUBGRADE INSPECTION

A. Notify Project Officer when excavations have reached required subgrade.

B. If Project Officer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the building slabs and 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. Limit vehicle speed to 3 mph.

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.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.09 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 Project Officer.

1. Fill unauthorized excavations under other construction or utility pipe as directed by Project Officer.

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 within 24 hours to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within tree protection areas and 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 Records Documents.

3. Testing and inspecting underground utilities.

4. Removing concrete formwork.

5. Removing trash and debris.

6. Removing temporary shoring and 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. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. 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 Division 3 Section “Cast-in-Place Concrete.”

D. Backfill voids with satisfactory soil while installing and removing shoring and bracing.

E. Place and compact final backfill of satisfactory soil to final subgrade elevation.

F. 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 6 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:

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 90 percent.

3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 90 percent.

4. For utility trenches, compact each layer of final backfill soil material at 95 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 Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn 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 SUBBASE AND BASE COURSES

A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase 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 and base course to required crown elevations and cross-slope grades.

4. Place subbase and base course 6 inches or less in compacted thickness in a single layer.

5. Place subbase 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 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.

3.18 FIELD QUALITY CONTROL

A. Testing Agency: The County shall engage a qualified independent geotechnical engineering testing agency to perform testing for critical structures, building foundations and any additional field quality control. The Contractor shall coordinate directly with testing agency.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. 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.

D. Testing agency with test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Trench Backfill: At each compacted bedding and final backfill layer, at least 1 test for each 300’ or less of trench length, but no fewer than 2 tests.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.19 PROTECTION

A. Protecting Graded Areas: Protect newly 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 Project Officer; reshape and recompact.

C. Where settling occurs before Project correction period elapses, removed 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.

3.20 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner’s property.

PART 4 - MEASUREMENT

4.01 For performing the work of SITE EARTHWORK in accordance with the plans, specifications and directions of the Project Officer, the Contractor shall receive the LUMP SUM price bid.

END OF SECTION 312000

SECTION 312500 - TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes temporary measures to control erosion and siltation.:

1. Measures shall include,
   a. Stone Construction Entrance
   b. Super Silt Fence
   c. Gravel Curb Inlet Sediment Filter
   d. Silt Fence Drop Inlet Protection

2. Temporary erosion and siltation control measures as described herein, shall be applied to erodible material exposed by any activity associated with construction, consistent with state and local erosion and sediment control standards.

B. Provide all labor, materials, tools and equipment necessary to install and maintain temporary erosion and sediment control measures identified on the approved plans as construction has been completed and Project Office has accepted the Project.

C. The Contractor is responsible for providing and maintaining facilities adequate to control erosion and sedimentation. The Project Officer reserves the right to order the performance of other temporary measures not specifically described herein to correct an adverse erosion or siltation condition.

D. Related Sections:

1. 312000 – Earth Moving

2. 311000 – Site Clearings, Preparations, Demolition and Removals

3. 311300 – Tree Protection and Root Pruning

4. 329200 – Seeding and Sodding

5. 329100 – Planting Preparation

E. In addition to the specifications contained herein, work shall be performed in accordance with the following:

1. Virginia Erosion and Sedimentation Control Handbook, Latest Edition

2. Underground Utility Protection Ordinance – Chapter 55 Arlington County Code

3. Arlington County Erosion and Sediment Control Ordinance – Chapter 57 Arlington County Code

4. Arlington County Department of Environmental Services (DES) Construction Standards and Specifications

5. Tree Protection Standards and Fencing Requirements – as contained in Arlington County Landscape Standards http://parks.arlingtonva.us/design-standards/ and in Section 311300.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials shall be at the Contractor's Option, in accordance with the approved erosion and sediment control plans and all applicable standards listed above.

PART 3 - EXECUTION

3.01 TIMING OF INSTALLATION

A. No grading operations will be allowed until temporary erosion and sediment control measures have been installed in accordance with the Erosion and Sediment Control Plan and all applicable standards listed above.

3.02 MINIMIZED EXPOSED SOIL

A. The Contractor shall limit surface area of earth material exposed by grubbing and stripping of topsoil and excavation to that which is necessary to perform the next operation within a given area.

B. Unless specifically authorized by the Project Officer, the grubbing of root mat and stumps shall be confined to the area over which excavation is to be actively executed within 30 days following the grubbing operations.

C. The stripping of topsoil shall be confined to the area over which excavation is to be actively within 15 days following the stripping operations.

D. Excavation and embankment construction shall be confined to the minimum area necessary to accommodate the Contractor's equipment and work force engaged in the earth moving work.

E. No disturbed area, including stockpiles, is to remain denuded longer than 30 days without temporary seeding or otherwise stabilizing the area.

3.03 CLEANING AND MAINTENANCE:

A. Control measures shall be periodically cleaned of silt and maintained. Immediately after every rainstorm, all control measures shall be inspected, and any deficiencies corrected by the Contractor.

PART 4 - MEASUREMENT

4.01 The measurement for STONE CONSTRUCTION ENTRANCE (PHASE 1 & 2) shall include the cost of all labor, materials, equipment and incidental expenses necessary to complete the work, in

accordance with the plans and specifications, and to the approval of the Project Officer.

4.02 The measurement for SUPER SILT FENCE (PHASE 1 & 2) shall be LINEAR FOOT and shall include the cost of all labor, materials, equipment and incidental expenses necessary to complete the work, in accordance with the plans and specifications, and to the approval of the Project Officer.

4.03 The measurement for GRAVEL CURB INLET SEDIMENT FILTER (PHASE 1 & 2) shall be EACH and shall include the cost of all labor, materials, equipment and incidental expenses necessary to complete the work, in accordance with the plans and specifications, and to the approval of the Pro- ject Officer.

END OF SECTION 312500

DIVISION 32

SECTION 321313 CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:

1. Concrete Walkways
2. Concrete Pads for Benches, Bike Racks and Trash/Recycling Receptacles

B. All paved surfaces must be compliant with the most current Americans with Disabilities Act Standards for Accessible Design. Refer to grading plan for specific notes.

1.02 RELATED DOCUMENTS

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

B. Virginia Erosion and Sedimentation Control Handbook, Latest Edition

C. Virginia Department of Transportation Roadway Specifications

D. Virginia Department of Transportation Road and Bridge Standards

E. Arlington County DES Construction Standards and Specifications – 02611 Concrete Walks

F. Section 116800 – Site Furnishings

G. Section 321123 – Aggregate Base Course and Underdrainage

H. Section 321817 - Poured-in-Place Rubber Surface System

1.03 DEFINITIONS

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

1.04 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Expansion Joint Sealant Samples: Provide full range of Manufacture’s colors for review and approval by Project Officer with confirmation by Landscape Architect

D. Qualification Data: For testing agency.

E. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
   1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

F. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:

   1. Cementitious materials.
   2. Steel reinforcement and reinforcement accessories.
   3. Fiber reinforcement.
   4. Curing compounds.
   5. Applied finish materials.
   6. Bonding agent or epoxy adhesive.
   7. Joint fillers.
   8. Waterstops

G. Field quality-control test reports.

H. Minutes of pre-installation conference.

I. Delivery tickets for concrete including the date, time, truck identification, concrete plant, plant inspector, ticket and load number, concrete class and design mix, moisture content of aggregates, quantity and location of placement.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.

   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

   1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.

D. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.

E. Concrete Testing Service: County may engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

F. Preinstallation Conference: Conduct conference at Project Site to comply with requirements in Division 1 Section "Coordination, Field Engineering, Cutting and Patching, and Regulatory Requirements."

1. Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:

   a. Contractor's superintendent.
   b. Independent testing agency responsible for concrete design mixtures.
   c. Ready-mix concrete producer.
   d. Concrete pavement subcontractor.

G. Mockups for Color Concrete: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups of color concrete mockups where directed by Project Officer with confirmation by Landscape Architect and not less than 60 inches by 60 inches.

1.06 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. Deliver, store, and handle steel reinforcement to prevent bending and damage.

C. Environmental Requirements:

1. In cold weather, concrete shall not be placed when temperature is, or is predicted to be, within the following 48 hours, below 40 degrees F unless proper provisions have been made for heating and protecting concrete in accordance with ACI 306R.
2. In hot weather, to prevent the development of high temperatures in fresh concrete, concrete shall be manufactured and cast in accordance with the recommendations of ACI 305R.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.02 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

1. Use flexible or 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 will not impair subsequent treatments of concrete surfaces.

2.03 STEEL REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

D. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed, or as denoted in the construction drawings.

E. Plain Steel Wire: ASTM A 82, as drawn.

F. Bar supports: Bolsters, chairs, spacers, and other devices for spacing, supporting and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice".

2.04 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:

1. Portland Cement: AASHTO M85 with exceptions as listed in the Road and Bridge Specifications of the Virginia Department of Transportation.

a. Fly Ash: ASTM C 618, Class C or F.
b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

2. Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag or IP, portland-pozzolan cement.

B. Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate, uniformly graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: Provide 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.

2.05 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

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.

F. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.

2.06 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: Joint filler shall be ½ inch preformed asphalt expansion joint material conforming to ASTM D 1751 or ASTM D994, asphalt-saturated cellulosic fiber.

B. If bituminous fiber material is used, a bond breaker such as one-half (1/2") wide polytheylene tape or five eights inch (5/8") diameter expanded polyethylene foam backer rod shall be installed as recommended by the manufacturer.

C. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery with 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.

D. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

E. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to requirements, and as follows:

1. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

F. 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.

G. 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.

2.07 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.

B. Proportion mixtures to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 4000 psi.
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.40 by weight.
3. Slump Limit: 2 to 3 inches prior to the addition of high-range water reducing admixture, if it is added at the Project Site. 5 to 8 inches at the point of placement. In no case shall water be added exceeding the specified water/cement ratio.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content: 6 percent plus or minus 2 percent for 1-1/2-inch nominal maximum aggregate size.
2. Air Content: 6 percent plus or minus 2 percent for 1-inch nominal maximum aggregate size.
3. Air Content: 6 percent plus or minus 2 percent for 3/4-inch nominal maximum aggregate size

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing 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.

F. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals.

1. Fly Ash or Pozzolan: 25 percent.
2. Ground Granulated Blast-Furnace Slag: 50 percent.

3. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 25 percent.

G. Color Pigment: If specified in the Bid Drawings, add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.08 JOINT FILLER

A. Joint filler shall be 1/2" preformed asphalt expansion joint material conforming to ASTM D994 or ASTM D1751.

2.09 EXPANSION JOINT SEALANT

A. Expansion Joint Sealant: Sealant shall be one-component polyurethane-based elastomeric sealant. Asphalt cement will not be approved as a substitution. Sealant color shall match color of adjacent pavement. Where joints fall between pavement sections of different colors, color shall be selected by Landscape Architect to match one of the pavement colors.

B. Products: Subject to compliance with requirements, provide one of the following or an approved equal:

1. SikaFlex-1a or approved equivalent, manufactured by Sika Corporation.
2. Sonoclastic NP-1or approved equivalent, manufactured by Sonneborn and Chem Rex Inc.
3. The sealing materials shall be delivered to the Project Site in unbroken original packages bearing the manufacturer's name.

C. Joint-sealant backer materials
1. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 deg F 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 mixes 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 mixes 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

3.01 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances with Project Officer present for compliance with requirements for installation tolerances and other conditions which might affect the performance of concrete. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction. Limit vehicle speed to 3 mph.
2. Proof-roll with a loaded 10-wheel tandem-axle dump truck weighing not less than 15 tons.
3. Subbase with soft spots and areas of pumping or rutting exceeding depth of ½ inch require correction according to requirements in Division 2 Section “Earthwork.”

C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

3.02 PREPARATION

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

3.03 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement 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. Forms shall be set to alignment and grade and to conform smoothly to the shapes and dimensions indicated on the Drawings. All curves, where shown on the drawings or as required, shall be smooth. No tangents or broken segments shall be accepted.

C. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.04 STEEL REINFORCEMENT

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.

3.05 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edgings 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 pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
2. Provide tie bars at sides of pavement strips where indicated.
3. Butt Joints: Use bonding agent 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 asphalt-coat 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, walks, 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. Protect top edge of joint filler during concrete placement 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 on the construction drawings. Construct contraction joints for a depth equal to at least one-third of the concrete thickness, as follows:

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 groover marks on concrete surfaces.
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.
3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.06 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation place steel reinforcement, and items to be embedded or cast in. Check tops of forms for grade before placing concrete. Notify other trades to permit installation of their work.

B. Obtain approval by the Project Officer with confirmation of the Landscape Architect before placing concrete.

C. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

D. 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.

E. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

F. Do not add water to concrete during delivery or at Project Site.

G. Do not add water to fresh concrete after testing.

H. 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.

I. 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.

J. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

1. Remove and replace concrete that has been placed for more than 15 minutes without being covered by top layer or use bonding agent if approved by Project Officer with confirmation by Landscape Architect.

K. Screed pavement surfaces with a straightedge and strike off.

L. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

M. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.

1. Compact sub-base and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

N. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.

O. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.07 FINISH

A. General: Do not add water to concrete surfaces during finishing operations.

B. 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.

3.08 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.

D. 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 curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moist 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 for curing concrete, 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 during 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.

3.09 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:
   1. Elevation: 1/4 inch.
   2. Thickness: Plus 3/8 inch, minus 1/4 inch.
   3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.

4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
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 independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd. or fraction thereof of each concrete mix 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 mix. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 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 five standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test 2 specimens at 7 days and 2 specimens at 28 days.

    a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mix will be satisfactory if average of any 3 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 Project Officer, 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 Project Officer 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 Project Officer.

G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.11 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

B. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

C. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial and Final Completion inspections.

END OF SECTION 321313

SECTION 321819 - BOULDERS

PART 1 - GENERAL

1.01 SUMMARY OF WORK

A. The Contractor shall furnish and install BOULDERS, STEP STONES, and OUTLET PROTECTION STONE in accordance with the plans and specifications.

1.02 RELATED SECTIONS

A. Section 033000 – Cast-in-Place Concrete

B. Section 312000 - Earthmoving

C. Section 321123 – Aggregate Base Course and Underdrainage

D. Section 321313 – Cement Concrete Pavement

1.03 SUBMITTALS

A. All submittals shall be as per Section 013300

1.04 QUALITY ASSURANCE

A. Contractor shall coordinate with Project Officer to arrange a site visit to a local quarry or stone distributor, to be located no more than 25 miles from 2100 Clarendon Blvd. Arlington, VA. DPR Landscape Architect shall hand select all boulders and step stones.

B. If contractor sources stone material from quarry or stone distributor more than 25 miles away from aforementioned address, DPR Landscape Architect reserves the right to reject any boulder or step stone. The contractor is responsible for removing rejected boulders from the Project Site and replacing rejected boulders with acceptable substitute. Removal and replacement shall be paid for by the contractor at no additional expense to Arlington County.

C. Contractor shall mock up selected boulders for each location on Project Site for review and approval by the DPR Landscape Architect.

D. DPR Landscape Architect shall review and approve placement of all boulders on Project Site.

E. Preinstallation Conference: Conduct conference at Project Site.

PART 2 - PRODUCTS

2.01 FIELDSTONE BOULDERS (FOR USE IN WALLS, CURBS, TURF AREAS & SWALE)

A. See plans. Boulders shall be Western Maryland Boulders or PA River Boulders, as approved by DPR Landscape Architect. Boulder selection shall be by DPR Landscape Architect.

B. Approximate boulder size shall be 3'x3'x3'. Minimum size of boulder shall be 1 ton.

PART 3 - EXECUTION

3.01 GENERAL

A. Per plans. Boulders, step stones, and outlet protection stone shall be installed per plans with review prior to final installation by Landscape Architect and Project Officer.

END OF SECTION 321819

SECTION 329100 - PLANTING PREPARATION

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes erosion control materials, soil amendments, mulching and topsoil.

B. Provide all labor, materials, tools and equipment as required to have topsoil, planting soil mix, soil stabilization, amendments, and mulch applied per the specifications on all areas disturbed by construction to receive plant materials as indicated in the approved plans.

C. Related Sections:

a. Section 311000 Site Clearing, Preparation, Demolition and Removals

b. Section 311300 Tree Protection and Root Pruning

c. Section 312000 Earth Moving

d. Section 312500 Temporary Erosion and Sediment Control

e. Section 329200 Seeding and Sodding

f. Section 329300 Exterior Plants

D. In addition to the specifications contained herein, Work shall be performed in accordance with the:

a. Drawings (especially planting plans and reforestation plan) and general provisions of the contract, including general and supplementary conditions

b. Arlington County Department of Parks & Recreation Design Standards as shown on the plans and available online at:

http://parks.arlingtonva.us/design-standards/

1.02 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Imported Topsoil: Soil obtained off-site that meets the specifications herein for topsoil and is suitable for use in planting soil/backfill soil mixture when existing soil quantities are insufficient.

C. Planting Soil/Backfill Soil Mixture: Existing soil modified as specified to be suitable for planting.

D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

E. ISA: International Society of Arboriculture

F. CBAY: Chesapeake Bay, typically referring to CBAY watershed.

G. Urban Forester/County Urban Forester: Refers to the Arlington County Urban Forester

H. Landscape Architect: Refers to an Arlington County Landscape Architect or their designee.

1.03 SUBMITTALS

A. Samples of all materials specified shall be submitted to the Project Officer for approval with coordination of the Landscape Architect. All approvals shall be in writing.

B. Samples:

a. Existing Topsoil: Provide 1-pound sample of existing topsoil with the following soil test reports.

i. Fertility: pH, nitrate nitrogen, ammonia nitrogen, phosphate phosphorous, potassium, calcium, magnesium, zinc, iron, manganese.
ii. Suitability: total salinity, boron, sodium, potassium, calcium, magnesium, chloride, sulfate.
iii. Physical properties including organic content and particle size distribution.

b. Imported Topsoil: If imported topsoil is required, Contractor shall provide a 1-pound sample of the imported topsoil with the soil test reports as noted above for "Existing Topsoil."

c. Imported Topsoil for Bioretention Areas: If bioretention areas are indicated in the approved plans, the Contractor shall submit soil sample per specifications.

d. Mulches and Organic Matter/Compost: Sample of mulch and organic matter/compost may be requested in lieu of inspection.

e. Product certificates: Contractor shall submit for each type of manufactured product, to be approved by the Project Officer in coordination with Landscape Architect or Urban Forester and complying with the following:

i. Manufacturer's certified analysis for standard products.

E. Geotextile/Soil Stabilization/Erosion Control Fabric: Sample

1.04 QUALITY ASSURANCE

A. Contractor shall have all existing and furnished topsoil to be used for seeding and sodding, and for planting areas tested by a state laboratory or recognized commercial soil-testing laboratory in order to determine recommendations for the types and quantities of soil amendments. The results of this test will determine the rates and types of fertilizers, lime, soil conditioners, and other amendments, if necessary.

a. Soil tests shall use a representative sample of on-site soils. If existing soil has been undisturbed and is suitable as determined by the soil test, no additional amendments are required.

b. Adjustments should be made based on soil test results.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All materials shall conform to those stipulated below, unless otherwise approved in writing by the Project Officer with confirmation by the Landscape Architect or County Urban Forester.

B. Specified materials to be applied in amounts and methods herein stipulated.

C. Delivery tickets indicating date, weight, analysis and vendor's name, to be submitted to Project Officer.

2.02 SOIL AMENDMENTS

A. Lime: Application rates for liming materials and lime material type chosen shall be determined by required soil tests and approved by the Project Officer in coordination with the Landscape Architect or Urban Forester.

a. When required and unless test results indicate otherwise, lime material shall be dry and free flowing pulverized limestone, hydrate lime or burnt lime that contains at least 50% total oxides (calcium oxide plus magnesium oxide). Ground limestone shall be ground to such fineness that at a minimum of 50% will pass through a 100 mesh sieve and 98% - 100% will pass through a 20 mesh sieve. Lime material shall meet the Virginia Agricultural Liming Materials Act, Code of Virginia Section 3.1-126.1.

B. Fertilizer: Fertilizer type and application rate shall be determined by results of required soil tests and approved by the Project Officer in coordination with the Landscape Architect or Urban Forester:

a. When required and unless test results indicate otherwise, commercial-grade complete fertilizer will be 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:

i. Composition: 10 percent nitrogen, 20 percent phosphorous, and 10 percent potassium, by weight.

b. All fertilizers shall be uniform in composition, free flowing, and suitable for application with approved equipment.

c. Fertilizers shall be delivered to the site fully labeled according to applicable state fertilizer laws and shall bear the name, trade name, or trademark and warranty of the product.

C. Delay mixing fertilizer with planting soil if planting will not proceed within 2 days.

D. Spread fertilizer and lime with approved equipment.

2.03 EXISTING TOPSOIL

A. Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation period and stockpiled.

a. Contractor shall verify suitability of stockpiled soil to produce or to be amended to produce viable planting soil for lawns and planting beds as described herein.

B. Existing topsoil is to be used to extent possible for lawn areas and is to be amended per the specifications to become the Planting Soil/Backfill Soil Mixture for use in planting pits and bed areas.

C. Prior to use for lawn areas or in planting soil mix, Contractor shall remove all stones, roots, plants, sod, clods, and clay lumps larger than 1/2 –inch in any direction, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris and other extraneous materials that are harmful to plant growth.

D. After removal of debris and extraneous materials noted above, the Contractor shall obtain soil tests for the existing soil per the requirements in section 1.04 “Quality Assurance.”

E. Contractor shall submit soil test results to the Project Officer for approval with confirmation by the Landscape Architect or Urban Forester.

F. Contractor shall supplement the existing soil as recommended in soil test results to achieve a viable planting soil for lawns and/or planting beds. Contractor shall supplement with imported topsoil per the specifications from off-site sources when quantities of approved, existing topsoil are insufficient for lawns and planting beds.

G. Contractor shall submit a sample of the topsoil that has been amended based on soil test results for approval by the Project Officer with confirmation by Landscape Architect or Urban Forester prior to use in lawn areas or planting beds or pits.

H. Topsoil installed on grade shall attempt to match existing soil texture, except for situations where clay subsoil exists. In the event that clay subsoil exists, use loam or silt loam topsoil.

I. Imported topsoil rather than existing topsoil is to be used for planting in bioretention areas, unless otherwise indicated on the approved plans.

2.04 PLANTING SOIL MIX/BACKFILL SOIL MIXTURE

A. The planting soil mix (also known as backfill soil mixture) shall consist of existing topsoil that has been approved for planting per the specifications above and approved organic matter.

B. The planting soil mix/backfill soil mixture shall be composed of ¾ approved existing topsoil and ¼ approved organic matter (leaf compost) as described in the Arlington County DPR Standard planting details, unless otherwise indicated by the Project Officer with confirmation by the Landscape Architect or Urban Forester.

2.05 IMPORTED TOPSOIL

A. Contractor shall add imported topsoil when required on the drawings, when quantity of existing topsoil is insufficient or when determined to be necessary due to soil testing results.

B. Topsoil shall be the natural, original surface soil, a sandy loam uniform in composition and shall be in a friable condition and shall contain less than 3 percent subsoil, hardpan material, stones and clods larger than 1/2 inch in diameter in any direction. It shall also be free of sticks, tree or shrub roots, debris and other material undesirable for plant growth. The area and the topsoil shall be free of undesirable plant such as, but not limited to, Bermuda grass, nut sedge, mugwort or noxious weeds as set forth in the Federal Seed Act.

C. The topsoil shall contain at least 5 percent organic matter. It shall be a sandy loam consisting of at least 5 but not more than 20% clay, at least 10 but not more than 80% sand. It shall have a pH between 5.5 to 6.5. Soluble salts (salinity) shall not exceed 500 ppm. Soil fertility shall be "High" in natural nutrients based on the coordinated ratings in pounds per acre as established by the National Soil and Fertilizer Research Committee.

D. Topsoil which has been manufactured by blending materials which individually do not meet the requirements of this specification will not be accepted even though the resulting blend meets the organic matter, mechanical analysis, pH and soluble salts requirements. Agricultural limestone at not more than 5 pounds per cubic yard of topsoil any be used to adjust the pH provided it is well mixed in a manner which does not destroy the structure of the soil.

2.06 MULCHES AND ORGANIC MATTER

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

B. Wood Chip Bark Mulch for Planted Areas: Wood Chip Bark Mulch shall be double-shredded hardwood bark mulch, uniform in size and free of stones, clods, non-organic debris or other foreign material and aged for at least 6 months from an approved source. Insufficiently or improperly aged mulch containing high bacterial counts or high levels of bark or other materials resistant to decomposition shall not be used. Mulch shall not contain the trunk of trees.

C. Organic Matter/Compost Mulch: Well-composted, trash-free, stable, and weed-free organic matter such as composted bark, leaf mold or other plant debris material that has been composted to a point of decay and is mature.

a. pH range of 5.5 to 8; moisture content 35 to 55 percent by weight
b. 100 percent passing through 1-inch sieve

c. Peat moss shall not be used.

d. Organic amendments shall be commercially prepared and shall comply with the U.S. Compost Council Seal of Testing Assurance Program's Test Methods for the Examination of Composting and Compost (STA/TMECC) criteria, or as modified in approved plan documents.

2.07 SOIL STABILIZATION/EROSION CONTROL FABRIC

A. ECS-2B Double New Straw Biodegradable Rolled Erosion Control Product, or an approved equal shall be used in all planting beds/reforestation areas. Install atop amended reforestation soils.

a. Shall meet Type 2.D specifications for ECTC and HFWA FP-03 Section 713.17

b. Shall have two (2) layers of organic jute netting sewn together with biodegradable thread.

c. Overlap sections 12" and secure with manufacturer's recommended steel wire staples, 6 inches long.

d. Secure to ground with biodegradable stakes on a 3'x3' grid.

PART 3 - EXECUTION

3.01 PREPARATION

A. All identified areas within the project limits shall have approved topsoil mix spread on them and be prepared for seeding and sodding by bringing ground surfaces to grades shown on the drawings. Planting pits and bed areas identified on the approved plans shall be prepared in accordance with the applicable DPR Landscape Standard details.

a. No seeding shall be done on frozen ground or when the temperature is 32F or lower. Refer to specification 329200, "Seeding and Sodding." Install erosion- control measures to prevent erosion or displacement of soils and discharge of soil- bearing water runoff or airborne dust to adjacent properties, sidewalks and areas.

b. Rototilling shall not be performed within the critical root zone of trees to be preserved.

c. The soil shall not be tilled or amended when the soil's moisture capacity is above field capacity or when the soil is frozen.

d. Contractor shall identify utilities, existing irrigation and underground utilities. All areas on either side of the utility marking shall be amended by hand.

e. Contractor shall verify that no foreign or deleterious material or liquid has been deposited in soil within a planting area.

f. Contractor shall proceed with installation only after both unsatisfactory conditions

have been corrected and rough grading has been completed and approved by the Project Officer in coordination with the Landscape Architect or Urban Forester.

g. Contractor shall protect structures, utilities, sidewalks, pavements and other facilities, trees, shrubs and plantings from damage caused by planting operations.

a. Protect adjacent and adjoining areas from hydro-seeding and hydro-mulching overspray.

b. Protect grade stakes set by others until directed to move them.

h. Surfaces shall conform to finish grade, free of water retaining depressions, soil friable, free of clay and of uniformly firm texture.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1/2 inch in any direction and sticks, roots, rubbish, and other extraneous matter including grass vegetation and turf and legally dispose of them off of Arlington County property. Do not mix into surface soil.

a. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix. Delay mixing amendments with soil if planting will not proceed within 2 days.

b. Loosen surface soil to a depth of at least of 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches of soil. Till soil to a homogeneous mixture of fine texture.

c. Spread planting soil mix to a depth of 4 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

C. Unchanged Subgrades: If lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare surface soil as follows:

a. Remove stones larger than 1/2 inch in any dimension and sticks, roots, trash, and other extraneous matter. Legally dispose them off Arlington County property. Do not mix into surface soil

b. Loosen surface soil to a depth of at least 6 inches, apply soil amendments and fertilizers according to the planting soil mix proportion and mix thoroughly into the top 4 inches of soil.

D. Finish Grading: Grade landscape areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Adjust for the thickness of sod, where applicable. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.

E. Contractor shall avoid unnecessary compaction of the soil during grading.

F. Contractor shall ensure appropriate slopes of the swales, berms and final grades.

G. Immediately following each day's work, contractor shall clean all dirt, excess soil, debris and trash from the site. Contractor shall protect and store additional soils in stockpiles protected from saturation, erosion, weed growth and contamination with plastic sheeting or tarps.

H. Amendments for seeding and sodding areas shall be applied after determining by soils test as follows:

a. Lime as specified shall be spread uniformly over designated area. Rate depends on soil tests. Soil tests shall be made before lime application at 8 to 10 plugs per acre taken by the method prescribed the United States Department of Agriculture.

b. Fertilizer shall be spread after the lime has been applied. Rate shall be as recommended per the soil tests.

c. Fertilizer shall be spread with approved equipment and at an even rate over the area to be seeded or sodded.

d. Work lime and fertilizer into top 4 inches of topsoil and grade to smooth surface ready for seeding.

I. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

J. Prepared lawns and planting areas shall be inspected and approved by Project Officer in coordination with Landscape Architect prior to seeding, sodding or planting.

K. If the graded areas develop volunteer weed growth, the growth shall be eliminated at the expense of the Contractor.

3.02 SOIL STABILIZATION MATERIALS

A. Prepare planting area as specified.

B. Moisten prepared planting area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

C. Install Soil Stabilization from top of slope, overlapping joints by 12 inches, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

D. Plant shrubs, trees and perennials through Soil Stabilization fabric by carefully separating fabric layers to allow space for planting.

E. Remove non-biodegradable stabilization materials after plant establishment.

3.03 ADDITIONAL PLANTING PREPARATION REQUIREMENTS FOR REFORESTATION AREAS

A. Maintain temporary tree protection fencing around the reforestation area perimeter in accordance with tree protection plans and specifications.

B. Establish erosion control and tree protection measures in accordance with E&S Plans, Tree Protection Plans and project specifications.

C. Remove existing swing set, footings, mulch, subbase, timber walls, underdrains and split rail fencing as shown on the Demolition Plan and in accordance with Specification 311000.

D. Do not disturb existing trees or their critical root zones.

E. Preserve and protect existing overhead utility lines. If any vegetation remains within the former playground area or reforestation area remains, treat the remaining herbaceous vegetation with a foliar application of herbicide. A second treatment may be necessary.

F. Amend existing soils with leaf compost, imported topsoil and water soil thoroughly.

G. See 3.01 to 3.02 for additional planting preparation requirements in the reforestation area.

END OF SECTION 329100

SECTION 329200 - SEEDING AND SODDING

PART 1 - GENERAL

1.01 SUMMARY

A. The work includes, but is not limited to the provision of all material, services, labor, and equipment necessary to perform the following as required per the plans for the establishment of turf, meadow grasses and/or wildflowers:
   a. Seeding
   b. Sodding
   c. Hydro-seeding
   d. Plugging

B. Related Sections:
   a. Section 310000 – Site Clearing, Preparation, Demolition and Removals
   b. Section 311300 – Tree Protection and Root Pruning
   c. Section 312000 – Earth Moving
   d. Section 312500 – Temporary Erosion and Sediment Control
   e. Section 321244 – Reinforced Turf Pavement
   f. Section 329100 – Planting Preparation
   g. Section 329300 – Exterior Plants

C. In addition to the specifications contained herein, Work shall be performed in accordance with the:
   a. Drawings (especially planting plans and reforestation plan) and general provisions of the contract, including general and supplementary conditions.
   b. Erosion and Sediment Control Ordinance (Chapter 57 of the Arlington County Code)
   c. Arlington County Department of Parks & Recreation (DPR) Design Standards as shown on the plans and available online at:

      http://parks.arlingtonva.us/design-standards/

1.02 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Imported Topsoil: Soil obtained off-site that meets the specifications herein for topsoil and is suitable for use in planting soil/backfill soil mixture when existing soil quantities are insufficient. Refer to Section 329100 “Planting Preparation.”

C. Planting Soil/Backfill Soil Mixture: Existing soil modified as specified to be suitable for planting. Refer to Section 329100 “Planting Preparation.”

D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

E. ISA: International Society of Arboriculture

F. CBAY: Chesapeake Bay, typically referring to CBAY watershed.

G. Urban Forester/County Urban Forester: Refers to the Arlington County Urban Forester

H. Landscape Architect: Refers to an Arlington County Landscape Architect or their designee.

1.03 SUBMITTALS

A. Samples of all materials shall be submitted to the Project Officer for approval with confirmation by the County Landscape Architect prior to delivery to site.

B. Contractor shall submit qualifications per section 1.04 “Quality Assurance” to Project Officer for approval.

C. Samples:

a. Seed Mix: Certification of grass seed including 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 the date of packaging.

b. Sod: Sod grower's name, together with substantiating information as to field location from which sod is to be cut and species, percent purity and mixture of grass sod to be applied. Samples or photos of sod mix may be requested in lieu of inspection.

c. Special Seed Mixes: Contractor shall submit product data per section 2.03.

1.04 QUALITY ASSURANCE

A. Contractor qualifications:

a. Evidence of completion of at least three (3) projects of similar nature and scope to this project completed within the last five (5) years that have resulted in successful turf and meadow establishment

b. Contractor shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.

c. Experience: Three to Five years’ experience in turf installation.

B. Contractor shall maintain an experienced full-time supervisor on Project site when work is in progress.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All materials shall conform to those stipulated below, unless otherwise approved in writing by the Project Officer with confirmation by the Landscape Architect.

B. Specified materials to be applied in amounts and methods herein stipulated.

C. Delivery tickets indicating date, weight, product data including all analyses for purity and other information as required herein, and vendor's name, to be submitted to Project Officer for approval.

2.02 SEED

A. Grass seed shall be fresh, clean, dry new crop seed complying with purity and germination requirements stipulated herein. All cultivars must be on the current "Virginia Turfgrass Variety Recommendations" or in the top 25 for transitional zone sites-overall of the latest National Turfgrass Evaluation Program (NTEP) as approved by Project Officer with confirmation by the Landscape Architect. The Turf-type Tall Fescue component shall be comprised of a minimum of two cultivars with each cultivar comprising neither less than 30 percent nor more than 70 percent of the blend. The use of K-31 Tall Fescue or Common Kentucky Bluegrass in the mix is prohibited. The mix shall have 2.5 percent maximum inert matter, 0.5 percent maximum crop seed, and 0.1 percent maximum weed seed and 0.0 percent noxious weed. The mix shall comply with the current Virginia Seed Law and Virginia Seed Regulations and approximate the following:

Kind of Seed	% by Weight	% Purity	% Germination
Turf-type Tall Fescue	80	97	85
Bluegrass	10	97	80
Perennial Ryegrass	10	97	90

B. Substitution of seed type or percent only on approval of Project Officer in coordination with Landscape Architect. Seed to be free of noxious weed seed.

2.03 SOD

A. Cultivated Grass Sod shall be certified and obtained from State Certified nurseries and have been grown on natural native mineral soils comparable to those afforded at the job site. Sod containing netting is not acceptable. Sod grower's information and sod information to be submitted for approval by Project Officer per section 1.03 "Submittals." Failure to obtain advance approval will constitute grounds for rejection of all sod delivered to the site. Invoices for all sod to clearly state point of origin and have attached to them a facsimile of the Grower's Nursery Certificate issued by the U.S. Department of Agriculture or Certified Delivery Ticket per truckload. All grass sod shall meet the following basic requirements.

a. Sod shall be free of disease and soil borne insects.

b. Sod shall be free of clover, broadleaf weeds and noxious weeds. Sod considered free of such weeds if less than 2 such plants are found per 100 square feet of area.

c. Sod shall be of uniform color and density and contain:

Kind of Seed	% by Weight
Turf Type Tall Fescue	90
Kentucky Bluegrass	10

d. All cultivars must be on the current approved list of the Virginia Turfgrass Variety Recommendations and the sod shall be certified by the Virginia Sod Certification Program. Provide appropriate certifications at the time of installation.

e. Sod sample shall be submitted to and approved by Project Officer in coordination with the Landscape Architect before cutting. Sod placed on the job shall conform to the approved sample or shall be removed and replaced at the Contractor's expense.

f. Sod shall have been mowed prior to stripping and shall have been maintained for a minimum of three months.

g. Sod shall be relatively free of thatch. Thatch build up that significantly detracts from the appearance of the sod may be sufficient cause for rejection.

h. Sod shall be machine stripped at a uniform soil thickness of approximately ¾-inch. Measurement for thickness to exclude tip growth and thatch.

i. Individual pieces of sod shall be cut to supplier's standard width and length. Maximum allowable deviation from standard widths and lengths shall be 5%. Broken pads, torn or uneven ends shall not be permitted.

j. Root development shall be such that standard size pieces will support their own weight and retain their size and shape when suspended vertically from a firm grasp on uppermost 10% of the area.

k. Under moderate moisture conditions, weight shall not exceed 7 pounds per square foot. Minimum weight shall not be less than 4 lbs. per square foot.

2.04 SPECIALTY SEED (REFORESTATION)

A. When specialty seed is explicitly specified in approved plans, and unless otherwise indicated, the specialty seed mix shall be as follows:

a. Ernst Seed Mix ERNMX-140 “Partially Shaded Area Roadside Mix,” or approved equal. The mix composition is specified on REF-01.

b. Seed carrier: Inert material, sharp clean sand mixed with seed at a ratio of not less than two parts seed carrier to one part seed.

B. Contractor shall supply the germination test results and the percent purity of the seeds upon delivery to the site to the Project Officer. All seed shall be cleaned, processed, analyzed for purity, stored, and germination tested before being used. Every seed variety contains different germination rates and requirements.

C. Execution:

a. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

b. Brush seed into top 1/8 inch of soil, roll lightly and water with light spray.

c. Protect seeded areas 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.

d. Water newly planted areas and keep moist until established.

2.05 SOILS & SOIL AMENDMENTS

A. Refer to Section 329100 “Plant Preparation” soils and soil amendment specifications.

2.06 MULCHES/ ORGANIC MATTER

A. Refer to Section 329100 “Planting Preparation” for mulch specifications.

2.07 SOIL STABILIZATION/EROSION CONTROL FABRIC

A. Refer to Section 329100 “Planting Preparation” for specifications.

PART 3 - EXECUTION

3.01 PREPARATION

A. Refer to Section 329100 “Planting Preparation” for specifications.

3.02 SEEDING - GRASS

A. All areas within the project limits that are not shown for paving, sodding, or special treatment shall be seeded with the specified seed mix.

B. Seeding shall take place between August 15th and October 15th or between March 15th to May 15th. Approval from Project Officer/Landscape Architect will be required before seeding is to begin.

C. Use 4” of prepared topsoil as base for areas to be seeded.

D. No seeding shall be done during windy weather (winds over 5 mph) or when ground is wet or otherwise non-tillable. No seed shall be done on frozen ground or when the temperature is 32 or lower.

B. Seed shall be uniformly distributed by hydro-seeding methods as specified:

a. Slurry

i. Seed as specified at a rate of 350 lbs./acre.
ii. Mulch: virgin wood fiber type applied at a rate of 1200 lbs./acre.
iii. Tackifier: Guar type or approved equal applied at a rate of 40 lbs./acre.
iv. Fertilizer: 19-19-19 granular applied at a rate of 500 lbs./acre.
v. Lime: Flowable liquid lime at a rate of 5 gallons per acre.
vi. Dye: Slurry must be green with dye added if not included with the mulch.
vii. Application rate: 3000 gallons per acre. Agitation must be maintained throughout mixing and application.
viii. Slurry shall be applied within 8 hours of the start of mixing.

C. In lieu of hydro-seeding, seed may be drilled or an alternate method may be used. If an alternate method is used, seeding will have to be run in two directions. The second direction being at right angles to the first direction. Requests for using alternate methods shall be approved by the Project Officer prior to application of seed.

D. Sow seed at the rate of 5 to 8 lb/1000 sq. ft.

E. Rake seed lightly into top 1/8 inch of topsoil, roll lightly, and water with fine spray.

F. Protect seeded areas with slopes not exceeding 6:1 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 depth over seeded areas. Spread by hand, blower, or other suitable equipment.

G. Areas indicated on plan or exceeding 6:1 slope shall be protected with erosion control fabric, jute mat, or similar slope protection, installed according to manufacturer’s written instruction, and/or as approved by the Project Officer.

3.03 SODDING

A. All sod shall be transplanted within 24 hours from the time it is harvested unless stacked at its destination in a manner satisfactory to the Project Officer. Do not lay down if dormant or if the ground is frozen or muddy.

B. All sod in stacks shall be kept moist and protected from exposure to air and sun and from freezing. Any sod permitted to dry out may be rejected whenever, in judgment of Project Officer, its survival after placing is doubtful. No payment shall be made for rejected sod. In any event, no more than forty-eight hours shall lapse between cutting and planting of sod is permitted.

C. Before placing or depositing sod upon any surfaces, all shaping and redressing of such surfaces as described under Seeding Soil Preparation shall be completed. The bed area for sod shall be dug out so that when the sod is installed the adjacent soil will be flush with the top of the sod root mat. Areas shall be watered lightly before the placing of sod; sod shall not be placed on dry surfaces. Completed areas to be sodded shall be a smooth, uniform, well-tilled surface true to line and cross section. Any raking required shall be done immediately prior to placement of the sod at no additional cost to Owner.

D. No sod shall be placed at any time temperature is below 32 degrees Fahrenheit. No frozen sod shall be used and no sod shall be placed upon frozen, powder dry or excessively wet soil.

E. Use 4” of prepared topsoil as base for areas to be sodded.

F. Sod shall be lifted from trucks or storage piles by hand and placed with closed joints and no overlapping. All cracks, seams and voids shall be closed with small pieces of sod. After laying sod shall be sprinkled thoroughly and then tamped. "Tamping" consists of firmly closing seams between strips by use of hand tampers or approved rollers. All sod shall be thoroughly rolled after closing all seams. Correct any slipping of sod.

G. Adequate water and watering equipment must be on hand before sodding begins and sod shall be kept moist until root system adheres to original seed bed and becomes established and accepted by Project Officer.

H. Sod shall be laid with long edges parallel to contours, except in swales or ditches where it shall be placed perpendicular to the flow line. Only sod placed in swales or ditches shall be staked using 2 stakes per roll of sod. Stakes shall be wood wedges ½” x 1” x 12”. Successive strips to be neatly matched and all joints staggered. Sod will be laid in all areas indicated on landscape plans.

3.04 REFORESTATION

A. Prepare planting area per the specifications.

B. Reforestation process:

a. Reforestation seed mix shall be applied prior to installation of Erosion Control Fabric. Rake seed lightly into the top 1/8 inch of soil, roll lightly and water with fine spray.

i. Do not use wet seed or seed that is moldy or otherwise damaged.

ii. Do not seed against existing trees or vegetation to remain within reforested area limits.

iii. Top dress seed by applying composted mulch within 24 hours after seeding operation. Soak areas, scatter mulch uniformly to a thickness of 1/2 inch and roll surface smooth.

b. Install erosion control fabric from top of slope, overlapping joints by 12 inches, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

c. Moisten prepared planting area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

d. Plant shrubs, trees and perennials through erosion control fabric by carefully separating fabric layers to allow space for planting.

C. Remove non-degradable erosion-control measures after grass establishment period.

D. Allow biodegradable soil stabilization matting to biodegrade.

3.05 PROTECTION

A. In reforestation area - following application of seed and all other reforestation area installation/execution, install permanent reforestation fencing on west side of reforestation in accordance with the plans and specifications. Install temporary reforestation fencing as shown on drawings.

B. Install post and rope barriers around seeded areas. Tie cloth or ribbon to rope at 10' intervals.

C. Install "KEEP OFF LAWN" signs at appropriate locations.

3.06 MAINTENANCE

A. Maintain surfaces and supply additional topsoil where necessary, including areas affected by erosion.

B. Water to ensure uniform seed germination and to keep surface of soil damp:

a. Each watering shall consist of 1 gallon per 3 sq. yd. of seed or sod

b. Apply water slowly so that surface of soil will not puddle and crust

C. Cut lawn areas when grass reached height of 3". Maintain minimum height of 2". Do not cut more than 1/3 of blade at any one mowing.

D. After first mowing of lawn, water grass sufficiently to moisten soil from 3" to 5" deep.

E. Reseed damaged grass areas showing root growth failure, deterioration, bare or thin spots and erosion.

3.07 GUARANTEE

A. The Contractor shall be responsible for maintaining all sodded and seeded areas in a healthy, vigorous condition in accordance with Section 3.05 “Maintenance” at his/her own expense until all contracted work is completed and accepted by Project Officer with confirmation by the Landscape Architect or Urban Forester.

B. The Contractor shall, at his own expense, replace any seed or sod which has died or been damaged during the establishment period.

C. Cost of seed and sod will be withheld from final payment until final approval is given by Project Officer.

3.08 ACCEPTANCE

A. Seeded areas will be accepted when an even, healthy, close and uniform stand of turf, 3” tall, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10sq. ft. and bare spots not exceeding 4 by 4 inches is properly established. Bare spots in excess of 4” shall be re-seeded at a rate per section 3.02 of this specification.

B. Sodded areas shall be accepted provided all requirements, including maintenance, have been complied with and sod is well established in a healthy, vigorous growing condition. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

C. Upon completion, all debris and waste material resulting from seeding/sodding/mulching activities shall be removed from the project area and legally disposed of. Any damaged areas shall be restored to their original condition.

D. Upon acceptance by Project Officer at Final Completion, Arlington County shall assume all lawn maintenance responsibilities.

PART 4 - MEASUREMENT

4.01 The measurement of SEEDING & TOPSOIL shall be the number of SQUARE FEET installed, including, but not limited to, all labor, materials, equipment, and incidental expenses necessary to complete the work in accordance with the plans and specifications to the satisfaction of the Project Officer.

4.02 The measurement of SODDING & TOPSOIL shall be the number of SQUARE FEET installed, including, but not limited to, all labor, materials, equipment, and incidental expenses necessary to complete the work in accordance with the plans and specifications to the satisfaction of the Project Officer.

4.03 The measurement of COMPOSTED MULCH shall be the number of CUBIC YARDS installed, including, but not limited to, all labor, materials, equipment, and incidental expenses necessary to complete the work in accordance with the plans and specifications to the satisfaction of the Project Officer

END OF SECTION 329200

SECTION 329300 - EXTERIOR PLANTS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes trees, shrubs, groundcover, bulbs, and perennial plants.

B. Provide all labor, materials, tools and equipment as required to have plants, topsoil, amendments, mulch and seed and/or sod applied on all areas called for on the approved plans.

C. Related Sections:

a. 311000 Site Clearing, Preparation, Demolition and Removals
b. 312500 Temporary Erosion and Sediment Control
c. 311300 Tree Protection and Root Pruning
d. 329100 Planting Preparation
e. 329200 Seeding and Sodding

D. In addition to the specifications contained herein, Work shall be performed in accordance with the:

a. Drawings (especially planting plans and reforestation plan) and general provisions of the contract, including general and supplementary conditions

b. Erosion and Sediment Control Ordinance (Chapter 57 of the Arlington County Code)

c. Arlington County Department of Parks & Recreation Design Standards as shown on the plans and available online at:

http://parks.arlingtonva.us/design-standards/

1.02 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Imported Topsoil: Soil obtained off-site that meets the specifications herein for topsoil and is suitable for use in planting soil/backfill soil mixture when existing soil quantities are insufficient. Refer to Section 329100 “Planting Preparation.”

C. Planting Soil/Backfill Soil Mixture: Existing soil modified as specified to be suitable for planting. Refer to Section 329100 “Planting Preparation.”

D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

E. ISA: International Society of Arboriculture

F. CBAY: Chesapeake Bay, typically referring to CBAY watershed.

G. Urban Forester/County Urban Forester: Refers to the Arlington County Urban Forester

H. Landscape Architect: Refers to an Arlington County Landscape Architect or their designee.

1.03 SUBMITTALS

A. All submittals specified in Section 329100 "Planting Preparation" shall be provided to Project Officer for approval with confirmation by Landscape Architect or Urban Forester. All approvals shall be in writing.

B. Product Certificates: Contractor shall submit for each type of manufactured product, to be approved by the Project Officer and complying with the following:

a. Manufacturer's certified analysis for standard products.

C. Refer to Section 329100, "Planting Preparation" for soil test requirements.

D. Contractor shall submit State Nursery inspection certificates to the Project Officer.

E. Contractor shall submit to Project Officer the verification of Landscape Industry Certified Technician and Landscape Industry Certified Officer certificates for those responsible for plant installation.

F. Planting Schedule: Contractor shall submit the planting schedule to the Project Officer for approval with confirmation by the Landscape Architect or Urban Forester. The plant schedule will indicate anticipated planting dates for exterior plants. Contractor shall be responsible for furnishing and installing all plant material shown on the drawings and plant list, as submitted with the contract. Contractor shall have investigated the sources of supply and satisfied himself/herself that he/she can supply all of the plants specified on the drawings in the size, variety, quantity and quality noted before submitting the bid. Failure to take this precaution will not relieve the successful bidder from the responsibility of furnishing and installing all of the plant material in strict accordance with the contract documents.

G. Substitutions:

a. The Contractor shall submit a written request for a substitute plant a minimum of forty-five (45) calendar days prior to planting date if specific plants will not be available in time for the scheduled planting. Contractor shall submit the request to the Project Officer for approval with confirmation by the Landscape Architect or Urban Forester.

b. Contractor shall be responsible for documenting any plant suitability or availability problems.

c. If a substitute plant is offered to the County, it shall be of the same size, value and quality as the plant originally specified on the plan, as determined by the Project Officer in coordination with the Landscape Architect or Urban Forester. If the County does not accept the substitute plant, the Contractor shall provide the type and size of plant material specified on the plans, or a substitute requested by the Project Officer in coordination with the Landscape Architect or Urban Forester.

H. Maintenance Instructions: Contractor shall submit to the Project Officer recommended procedures for maintenance of exterior plants during a calendar year. Submit before end of required maintenance periods.

1.04 QUALITY ASSURANCE

A. Installer Qualifications:

a. Contractor shall designate a project crew leader who possesses one or more of the following certifications:

i. Certified by the Professional Landcare Network (PLANET) as a "Landscape Industry Certified Technician"

ii. Certified by the Professional Landcare Network (PLANET) as a "Landscape Industry Certified Officer"

b. The Contractor shall identify to the Project Officer at least one full-time on-site supervisor who is the Contractor's competent, qualified, and authorized person on the worksite and who is, by training or experience, familiar with the policies, regulations and standards applicable to the work being performed, and capable of sufficiently communicating with the Project Officer.

c. Crew leader and supervisor may be the same individual.

B. Installer Qualifications for Reforestation Projects:

a. ISA Certified Arborist shall be on the worksite during planting of reforested areas.

b. Demonstrate experience in Reforestation/Afforestation and Stream-Bank Stabilization projects through:

i. Project portfolio detailing a minimum of three (3) successfully completed reforestation/afforestation/streambank restoration projects in the CBAY watershed area over the past three years.

c. The County will, throughout the contract term, have the right of reasonable rejection and approval of staff or subcontractors assigned to the project by the Contractor. If the County reasonably rejects staff or subcontractors, the Contractor shall provide replacement staff or subcontractors satisfactory to the County in a timely manner and at no additional cost to the County. The day-to-day supervision and control of the

Contractor's employees, and any employees of any of it subcontractors, shall be solely the responsibility of the Contractor.

C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory. Comply with requirements in Section 329100, "Planting Preparation."

D. Provide quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in the most current version of ANSI Z60.1, "American Standard for Nursery Stock." Plants shall be nursery grown stock and conform to the requirements described in the most current issue of the American Standard for Nursery Stock (ANSI) published by the American Nursery and Landscape Association. The Project Officer with confirmation by the Landscape Architect or Urban Forester may reject any non-conforming stock and has the option to field-select plant materials prior to purchasing.

E. Collected material may be used only when approved by Project Officer with confirmation by Arlington County Urban Forester and/or DPR PNR Natural Resource Manager

F. Nomenclature shall be in accordance with *Hortus III*, by L.H. Bailey. All trees and shrubs shall be labeled with a securely attached, waterproof tag bearing legible designation of botanical and common name. Perennials and groundcovers shall be clearly identified with a waterproof tag bearing legible designation of botanical and common name within the container.

G. Pre-installation Conference: Conduct conference at Project site with Project Officer, Arlington County Urban Forester and/or Department of Parks and Recreation (DPR) representative or County Landscape Architect.

H. Urban Forester Notification: Notify the Project Officer at least 72 hours prior to commencement of tree planting operations, so that the County's Urban Forester can be present on-site to observe the work.

I. The Contractor shall provide a minimum of seven (7) business days' notice to the Project Officer prior to installing the plant material (this is not the same as inspection notification).

J. At the request of the Project Officer in coordination with the Urban Forester or Landscape Architect, the Contractor shall supply information specifying the provenance of the plant material. Provenance is the geographical origin of the seed or cutting used in propagation and can have a direct effect on plant vigor and survivability.

K. Inspections:

a. Urban Forester may perform periodic inspections to check on tree plantings.

b. Contractor shall arrange a meeting on site with the Project Officer in coordination with the Urban Forester and/or Landscape Architect to perform final inspection of plantings. Refer to section 1.07 "Final Inspection."

1.05 WORKMANSHIP

A. Any tree pruning shall conform to the most current version of ANSI A-300 Standard Practices for Trees, Shrubs, and Other Woody Plant Maintenance. Do not prune trees and shrubs before delivery.

B. Protect bark, branches, and root systems from sun-scald, drying, 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 exterior plants during delivery. Do not drop exterior plants during delivery. Plants shall not be bound with wire or rope at any time so as to damage the bark or break branches. Plants shall be handled from the bottom of the root ball only.

C. All plants in transit shall be tarped or covered and shall be kept from drying out. Desiccation damage shall be cause for rejection. Plants damaged in handling or transportation may be rejected by the Project Officer with confirmation by the Urban Forester/Landscape Architect. Any tree or shrub found to have wounds over 12.5% of the circumference of any limb or trunk, or over 1 inch in any direction, whichever is smaller, shall be rejected.

D. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants trees in shade, protect from weather and mechanical damage, and keep roots moist. Plants shall not remain unplanted for longer than a three-day period after delivery. Any plants not installed during this time period shall be rejected, unless Project Officer and contractor provide otherwise by written agreement. All plants kept on site for any period of time shall be watered and cared for using ANSI A300 standards.

E. Plants shall be installed immediately following excavation of the hole. No holes shall remain open overnight. The Contractor shall cover and barricade any open holes to effectively prevent any danger of injury to pedestrians.

F. During delivery and installation, the landscape contractor shall perform in a professional manner, coordinating his/her activities so as not to interfere with the work of other trades, and leaving his/her work area(s) clean of litter and debris at the close of each workday.

G. During planting, all areas shall be kept neat and clean, and precautions shall be taken to avoid damage to existing plants, trees, turf and structures. Where existing trees are to be preserved, additional precautions shall be taken to avoid unnecessary accumulation of excavated materials, soil compaction, or root damage. The Contractor shall cover sidewalks or pavers with plywood, and cover turf with plywood, burlap or tarp during excavation.

H. Any damaged areas caused by the Contractor shall be restored to their original condition at no cost to the County. All debris and waste material, including small stones and clumps of clay or dirt exceeding 1” by 1” in any direction, resulting from planting operations shall be removed from the project, legally disposed, and the area cleaned up by the Contractor.

I. Plants with soil covering the root flare, if not removed by Contractor, shall be rejected by Project Officer with confirmation by Landscape Architect or Urban Forester.

J. Contractor shall take full responsibility for any cost incurred due to damage of utilities by their operations.

K. The Contractor will not be held responsible for uncommon concealed conditions such as concrete/asphalt/stone spoils encountered in excavation work which are not apparent at the time of bidding. Rocks, tree roots and hard clay are common elements of "urban" soils and will frequently be encountered in the execution of the contract.

L. No plants shall be planted in locations where drainage may, in the opinion of the Contractor, be unacceptable. Such situations shall be brought to the attention of the Project Officer before work continues and, if deemed necessary by the Project Officer with confirmation by the Landscape Architect/Urban Forester, the plants shall be relocated or the contract shall be modified to allow for drainage correction at a negotiated cost. Any such modification shall be in writing and signed by both parties.

M. The Contractor shall layout plants according to the project's landscape plan. The Project Officer shall approve the layout with confirmation by the Landscape Architect prior to plant installation. Plants installed without layout approval from the Project Officer with confirmation by Landscape Architect are subject to removal and replanting by the Contractor at no additional cost to Arlington County.

1.06 WATER REQUIREMENTS

A. Initial Waterings: The Contractor shall supply water for all plantings and shall water all plants at time of installation and 48 hours after installation, even if it is raining. Contractor shall then water plantings at least twice per week at amounts specified below until final acceptance of work.

B. Each watering shall consist of:

a. 20 gallons per individual tree

b. 4 gallons per individual shrub

c. 1 gallon per 1 sq. yd. of shrub or perennial bed

d. 1 gallon per 3 sq. yd. of seed or sod

1.07 FINAL INSPECTION

A. Contractor shall schedule the final inspection with the Project Officer in coordination with the Urban Forester and/or Landscape Architect.

a. Contractor shall notify Project Officer at least one week in advance to arrange final inspection meeting with the Urban Forester and/or Landscape Architect.

b. Contractor shall conduct the final inspection of the landscape materials no less than three months after the installation of the plants or substantial completion of construction work, whichever comes last, and in the presence of the Project Officer, the Urban Forester and/or Landscape Architect.

c. The landscaping inspection will review all landscape work under the contract.

d. All plants shall be alive and in good health at the time of final inspection.

e. Any plant material that is 25% dead or more shall be considered dead and shall be replaced at no charge to the County. A tree shall be considered dead when the main leader has died back, or 25% of the crown is dead.

f. It shall be the Contractor's responsibility to provide in writing the results of this inspection.

g. The Contractor shall make replacements during the next planting period unless the County specifies an earlier date.

h. The replacement plants will be reviewed for final acceptance no less than three months after installation. Contractor is responsible for maintenance and watering of replacement material per Section 1.06 and Section 1.08 after planting and until the replacement plantings are finally accepted by Project Officer.

i. A replacement plant shall be of the same size as the original plant with no additional soil additives to be used.

j. The Contractor will not be responsible for plants that have been damaged by vandalism, fire, removal or other activities beyond the control of the Contractor.

1.08 MAINTENANCE

A. Trees, Shrubs, Perennials, Bulbs & Groundcovers: Contractor shall maintain plantings at his/her own expense until final acceptance of the plantings as specified herein section 1.07.

B. Maintenance shall include pruning, mulching, cultivating, watering, weeding, fertilizing, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings.

C. Pruning: Remove all sucker growth, dead or broken branches at initial planting and as needed during the warranty period. Pruning will conform to ANSI-300 Tree Pruning Standards.

D. Fertilizing: No plants shall be fertilized without prior approval of Project Officer with confirmation by the Urban Forester or Landscape Architect.

E. Mulching: Contractor shall re-mulch areas to a depth of two to three inches prior to final acceptance if the time between planting and final acceptance extends beyond six months. Mulch will be of the same quality as mulch provided at the time of planting. Keep mulch six-inches away from trunks of trees and shrubs.

F. Weeding: Contractor shall perform weeding until final acceptance to keep the planting area as free of weeds as possible. A minimum of one weeding per month from April

through October is required if time between planting and final acceptance extends through any months of the growing season.

G. Stakes and Guy Supports: If installed, Contractor shall monitor and adjust all stakes and guy supports until final acceptance.

PART 2 - PRODUCTS

2.01 EXTERIOR PLANTS

A. Contractor shall select plants only from nurseries that have been inspected by state or federal agencies and shall have been grown in USDA Plant Hardiness Zones 4, 5, 6, or 7, and in one of the following states: Maryland, Virginia, Delaware, New Jersey, North Carolina or Pennsylvania.

B. Tree and Shrub Material: Furnish nursery-grown trees and shrubs complying with the most current version of ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun-scald, injuries, abrasions, and disfigurement.

a. Provide balled and burlapped, bare root or container-grown trees and shrubs, as indicated on the Drawings.

b. Balled and Burlapped (B&B) plants shall be dug with firm root balls of earth and free of noxious weeds. There shall be no extra soil on top of the root ball or around the trunk. Balled and burlapped trees shall be securely held in place by untreated burlap and stout rope. Nylon rope is NOT acceptable. Loose, broken or manufactured balls are unacceptable.

c. Ball sizes shall be in accordance with current ANSI standards.

d. In size-grading B&B single stem trees, caliper shall take precedence over height. For multiple-trunk trees, height measurement shall take precedence over caliper.

e. Trees over 3/4” in caliper shall have a strong central leader (free and clear of branches or splits in the trunk) from the top of the root ball to a height of at least 4’-6”. Trees over 2” in caliper shall be free and clear of branches or splits in the trunk up to 6’-6”. If the original leader has been headed, a new leader of at least one-half of the diameter of the original leader shall be present. Only minimal bends in the trunk will be acceptable. Co-dominant stems and V-crotches shall be cause for rejection.

f. The root system of container-grown plants shall be free of injury from biotic and abiotic agents, shall be well developed and well distributed throughout the container.

g. All container-grown trees and shrubs that have circling and matted roots shall be rejected.

C. Perennials: Provide healthy, container-grown plants with well-developed, fibrous root systems from a commercial nursery, of species and variety shown in the Drawings. All container grown plants shall be healthy, vigorous, well rooted and established in the container in which they are growing. A container grown plant shall have a well- established root system reaching the sides of the container to maintain a firm root ball, but shall not have excessive root growth outside the container.

D. Bulbs: Provide top size bulbs as indicated on plan in accordance with most current version of ANSI A60 specification.

E. Field grown trees and shrubs shall be grown in soils of the Piedmont region, or west of that region in the above approved states and zones.

F. All plant materials shall be labeled by grower to identify genus, species, and cultivar, if applicable, in accordance with Section 1.04 "Quality Assurance," above.

G. Bare root plant materials: Bare root plants will be dug with adequate fibrous roots. Do not root prune. Roots shall be protected during handling and planting to guard against drying out and damage.

H. Plant Materials for ecologically sensitive areas: Plant materials identified on planting plan as being located within an Arlington County Natural Resource Conservation Area (NCRA) shall be native species of local provenance.

a. Plant stock shall originate from a location within 150 miles of Arlington County.

2.02 OTHER MATERIALS

A. Refer to Section 329200 "Seeding and Sodding" for specifications for seeding, specialty seeding, sodding, and soil stabilization/erosion control fabric.

B. Refer to Section 329100 "Planting Preparation" for specifications for soils, mulch, soil amendments and other items related to planting preparation.

PART 3 - EXECUTION

3.01 EXTERIOR PLANTING

A. Contractor shall install plant materials in accordance with the current Arlington County Standard Planting Details as published on the Arlington County website and as specified below.

B. Refer to Section 329100 "Planting Preparation" for specifications on soil amendments.

a. Remove existing sod, turf, weeds or other plant material.

b. Rototill subgrade of planting beds to a minimum depth of 8 inches with the addition of 3 inches organic material. Edge and rake the entire planting bed.

c. Remove stones, clods, debris, sticks, roots and other foreign or extraneous matter larger than 1/2 inch in any dimension. Contractor shall legally dispose of them off Arlington County property.

d. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.

e. Spread planting soil mix to a depth of 8 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

f. Finish Grading: Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

g. Planting operations shall be performed during periods within the planting season when weather and soil conditions are suitable and in accordance with accepted local practice. Plants shall not be installed in top soil that is in muddy or frozen condition. Lawns, trees and shrubs shall be installed between 03/15 and 06/15 or between 09/15 and 12/01. If a project completion is outside of this planting period, contact the Arlington County Urban Forester to obtain a deferral or approval for planting out of season.

C. Plant Layout

a. The Contractor shall layout and space plants according to the project landscape plan.

b. When the layout is complete, the Contractor shall notify the Project Officer for approval with confirmation by the Landscape Architect prior to installation of the plants.

D. Landscape Plantings (Trees, Shrubs, Ground Covers and Perennials)

a. Contractor shall install plantings in accordance with Arlington County DPR standard details available online at: http://parks.arlingtonva.us/design-standards/. Refer to plans for appropriate planting details.

b. Handling: Prepare pit and/or planting bed per standards. Place plant in pit by carrying by the root ball (not by branches or trunk) and plant per the DPR Standards. Make sure the plant remains plumb during the backfilling procedure.

E. Tree and Shrub Pruning: Contractor shall conform to the most current version of ANSI A-300 Tree Pruning Standards. Do not cut tree leaders; remove only injured or dead branches from trees and shrubs, or those that pose a hazard to pedestrians. Make all cuts back to a lateral branch or bud. Cuts should be perpendicular above branch collar. Final pruning shall be done after the tree is in place. Do not prune into old wood on evergreens.

F. Plant Protection: Contractor shall protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged exterior planting. Injured roots shall be pruned to clean ends before planting with clean, sharp tools per most current ANSI 300 specifications.

a. Protect shrubs, groundcovers and perennials from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

G. Contractor shall remove all tags, labels, strings and wire from the plants, unless otherwise directed.

H. Contractor shall remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off of Arlington County property.

I. Refer to Section 1.06 'Water Requirements.'

3.02 STAKING & GUYING TREES

A. Contractor shall stake and guy trees only if required by Urban Forester.

B. If staking and guying is required, the Contractor shall provide and install stakes and guying in accordance with DPR standard staking details for deciduous and evergreen trees.

END OF SECTION 329300

DIVISION 33

SECTION 331116 - WATER DISTRIBUTION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes water-distribution piping and related components outside the for the ground hydrant.

B. Related Sections:

1. Section 311000 – Site Clearing, Preparation, Demolition, and Removals

2. Section 312000 – Earth Moving

3. In addition to the specifications contained herein, Work shall be performed in accordance with the following:
   a. Underground Utility Protection Ordinance – Chapter 55 Arlington County Code
   b. Arlington County Department of Environmental Services (DES) Construction Standards and Specifications, latest edition
   c. Arlington County Plumbing Code (Chapter 18 of the Arlington County Code).

1.03 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Complete details of layout and assembly, showing member sizes and part identification, fasteners, anchors, and fittings, as well as dimensions, method of field assembly, and components.

C. Field quality-control test reports.

D. Operation and maintenance data.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of Arlington County.

2. Comply with standards of Arlington County for potable-water-service piping, including materials, installation, testing, and disinfection.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

1.05 COORDINATION

A. Contractor shall coordinate with Arlington County. Arlington County is responsible for the service connection to County water main in 11th Street North as well as new water meter and crock. Coordinate with utility company as required by code.

1.06 REGULATORY REQUIREMENTS

A. Obtain plumbing trade permit for the installation of the water service system.

B. Comply with requirements of Arlington County DES. Including tapping of water mains and backflow prevention.

C. Comply with standards of Arlington County DES for non-potable water service piping, including materials, installation, testing, and disinfection.

D. Comply with governing EPA notification regulations before starting demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

PART 2 – PRODUCTS

2.01 PIPE AND FITTINGS

A. Provide seamless water tube AWWA type K copper pipe conforming to ASTM designation B88 requirements in accordance with Arlington County Department of Environmental Services (DES) Construction Standards and Specification, Section 02550 Water Mains and Appurtenances.

B. Fittings shall be underground copper service flared type.

2.02 METER CROCK

A. Provide in accordance with Arlington County Construction Standards & Specifications, Section 02550 Water Mains & Appurtenances, September 2020.

2.03 NON-FREEZE GROUND HYDRANT

A. Description: Non-freeze ground hydrant Model 5811 by Jay R. Smith Manufacturing Company or approved equal.

PART 3 – EXECUTION

3.01 EARTHWORK

A. Refer to Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

B. Comply with Arlington County Construction Standards & Specifications, September 2020.

3.02 INSTALLATION OF WATERLINE AND ALL APPURTENANCES

A. Coordinate with Arlington County Department of Environmental Services (DES) for connection from the meter crock to the ground hydrant.

B. Install copper tube and fittings according to CDA's "Copper Tube Handbook."

C. Bury piping with depth of cover over top at least 42 inches, with top at least 12 inches below level of maximum frost penetration.

D. Install in accordance with Arlington County Construction Standards & Specifications, September 2020.

3.03 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests in accordance with Arlington County Construction Standards & Specification, Section 02550 Water Mains & Appurtenances, September 2020.

B. Prepare reports of testing activities.

3.04 IDENTIFICATION

A. Install continuous underground warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Install continuous underground warning tapes in accordance with Arlington County Construction Standards and Specifications, September 2020.

B. Permanently attach equipment nameplate or marker in accordance with Arlington County Construction Standards and Specifications, Section 02550 Water Mains & Appurtenances, September 2020.

3.05 CLEANING

A. Clean and disinfect water-distribution piping in accordance with Arlington County Construction Standards & Specification, Section 02550 Water Mains & Appurtenances, September 2020.

B. Prepare reports of purging and disinfecting activities.

PART 4 – MEASUREMENT

4.01 The quantity of COPPER PIPE shall be the number of LINEAR FEET as delivered to the site, furnished, and installed at project completion in accordance with the plans and specifications.

4.02 The quantity of METER CROCK shall be EACH as delivered to the site, furnished, and installed at project completion in accordance with the plans and specifications.

4.03 The quantity of NON-FREEZE GROUND HYDRANT shall be EACH as delivered to the site, furnished, and installed at project completion in accordance with the plans and specification.

END OF SECTION 331116