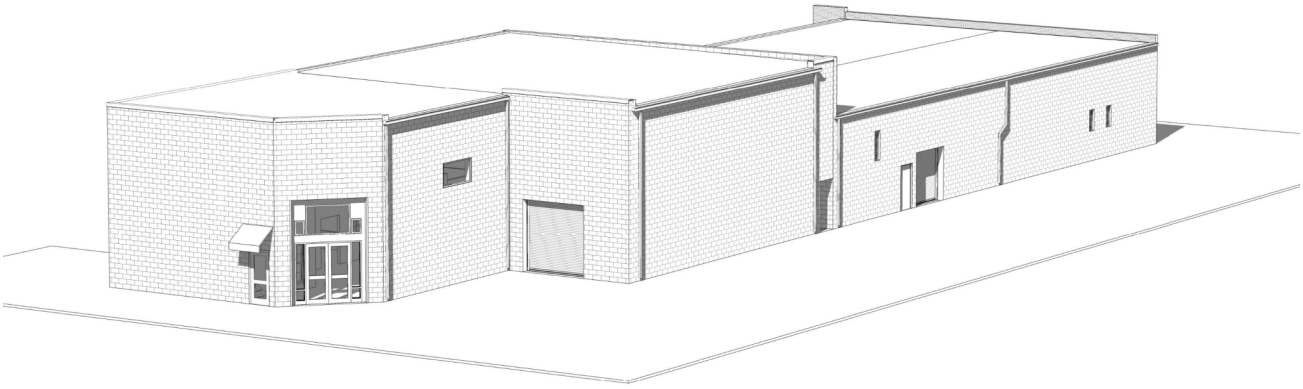
2700 S NELSON & 2701 OAKLAND STREET DEMOLITION SPECIFICATIONS
BID SET



RRMM Project #:	13356.35
Address:	2700 S NELSON & 2701 OAKLAND STREET, ARLINGTON, VA 22206
Date:	SEPTEMBER 26, 2022

RRMM ARCHITECTS

ARLINGTON VIRGINIA

Architect / Interior Design:	RRMM Architects
Civil Engineer / Landscape:	A. Morton Thomas and Associates, Inc.
Structural & MEP Engineer:	Greenman-Pedersen, Inc.
Cost Estimator:	Downey & Scott

SPEC #	SPEC TITLE
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-	COVER SHEET
-	TABLE OF CONTENTS
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001116	INVITATION TO BID
002113	INSTRUCTIONS TO BIDDERS
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DIVISION 1	GENERAL REQUIREMENTS
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012600	CONTRACT MODIFICATION PROCEDURES
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013100	PROJECT MANAGEMENT AND COORDINATION
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076200	FLASHING AND SHEET METAL
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260533	RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
260544	SLEEVES AND SLEEVES SEALS FOR ELECTRICAL SYSTEMS

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321373 CONCRETE PAVING JOINT SEALANTS
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329200 TURF AND GRASSES

APPENDIX A

"PRE-DEMOLITION LIMITED REGULATED HAZARDOUS MATERIALS SURVEY REPORT FOR WAREHOUSE BUILDING, ARLINGTON COUNTY 2700 NELSON STREET ARLINGTON, VIRGINIA 22206" REPORT DATED 11-11-2021 BY JSK ENVIRONMENTAL SERVICES, LLC.

END OF TABLE OF CONTENTS

SECTION 011100 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnish all labor, new materials, tools, equipment, supplies and services for all work as indicated, in accordance with provisions of the Contract Documents.

B. Although such work is not specifically indicated, furnish and install all supplementary, miscellaneous, incidental items, tests and inspections, appurtenances and devices incidental to, or necessary for, a sound, secure and complete installation.

C. The Work shall be complete, and all work, materials, and services not expressly called for in the Specifications which may be necessary for complete and proper construction to carry out the Contract in good faith, shall be performed, furnished, and installed by the Contractor at no additional cost to the Owner. Qualified, careful and experienced workers shall execute the Work in the best and most workmanlike manner.

1.2 SUMMARY OF WORK

A. This project includes the demolition of two 2-story buildings at 2700 South Nelson Street and 2701 S Oakland Street in Arlington, Virginia. Demolish existing structure, remove all existing footings and foundation walls, backfill and compact as required and restore the site as directed in the drawings and specifications. See drawings and specifications for the complete scope of work.

B. The summary of Work described herein is an overall summary of the responsibilities of the Contractor and his relation to the Owner. It does not supersede the specific requirements of the Contract Documents.

C. Salvage Materials: See drawings and section 017419 - Construction Waste Management and Disposal for items to be salvaged

1.3 WORK SITE INSPECTION

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

1.4 PROJECT INFORMATION

A. Project Identification: 2700 S Nelson & 2701 Oakland Street Demolition

B. Project Location: 2700 S Nelson Street & 2701 S Oakland Street, Arlington, VA 22206

C. Owner:
Arlington County, Facilities Design & Construction
1400 N Uhle St.
Arlington, VA 22201
P: 703.228.4509

D. Architect:
RRMM Architects, PC

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

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

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

1.5 CONTRACTOR'S USE OF SITE

A. Use of Site: Unrestricted Use of Site: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
B. Condition of Existing Building: Maintain portions of existing buildings affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.6 COORDINATION WITH OCCUPANTS

A. Occupancy: The existing buildings at 2700 S Nelson Street and 2701 S Oakland Street are not occupied.

1.7 WORK RESTRICTIONS

A. Comply with restrictions on construction operations.
    a. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
B. On-Site Work Hours: Limit work to between 7:00 a.m. to 7:00 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
C. Existing Utility Interruptions: Do not interrupt utilities serving occupied, adjacent buildings to remain unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:
D. Notify owners of adjacent buildings not less than seven days in advance of proposed utility interruptions.
E. Obtain written permission from Owners of adjacent buildings before proceeding with utility interruptions.
F. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to adjacent occupied buildings with owners.
G. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances on Project site is not permitted.
H. Employee Screening: Comply with Owner's requirements for drug screening of Contractor personnel working on Project site.
I. Contractor is responsible for examination of the work site and a thorough acquaintance with the details and requirements of the Contract Documents including obstacles likely to be encountered in the performance and completion of the Work. No allowance will be made, subsequent to completion of the bidding process, for any error or negligence, inadvertent or otherwise, on the part of the Contractor, for failure to comply with documented contract requirements.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 011100

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

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

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue[through Construction Manager] supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on [AIA Document G710] [form included in Project Manual] [web-based Project management software].

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: [Architect] [Construction Manager] will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by [Architect] [Construction Manager] are not instructions either to stop work in progress or to execute the proposed change.
2. Within [time specified in Proposal Request] [or] [20 days, when not otherwise specified,] <Insert number of days> after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times,

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

e. Quotation Form: Use [forms provided by Owner. Sample copies are included in Project Manual] [forms acceptable to Architect] [form provided as part of web-based Project management software].

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to [Architect] [Construction Manager].

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use [form provided by Owner. Sample copy is included in Project Manual] [form acceptable to Architect] [form provided as part of web-based Project management software].

1.5 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

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

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, [Architect] [Construction Manager] will issue a Change Order for signatures of Owner and Contractor on [AIA Document G701] [AIA Document G701CMa] [form included in Project Manual] [form provided as part of web-based Project management software].

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: [Architect] [Construction Manager] may issue a Construction Change Directive on [AIA Document G714] [AIA Document G714CMa] [form included in Project Manual] [form provided as part of web-based Project management software]. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.8 WORK CHANGE DIRECTIVE

A. Work Change Directive: [Architect] [Construction Manager] may issue a Work Change Directive on [EJCDC Document C-940] [form included in Project Manual] [form provided as part of web-based Project management software]. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.

1. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, List of Subcontracts, and Submittal Schedule.

B. The Contractor's Construction Schedule and Submittal Schedule are included in Section "Submittals".

1.3 SCHEDULE OF VALUES

A. The General Contractor shall coordinate preparation of its Schedule of Values for its part of the Work with preparation of the Contractors' Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:

a. Contractor's construction schedule.
b. Application of Payment form.
c. List of subcontractors.
d. List of products.
e. List of principal’s suppliers and fabricators.
f. Schedule of submittals.

2. Submit the Schedule of Values to the Project Officer at the earliest feasible date, but in no case later than 7 days before the date scheduled for submittal of the initial Application for Payment.

B. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for the Schedule of Values. Also include all items shown on the drawings but not included in a particular specification section.

1. Identification: Include the following Project identification on the Schedule of Values:

a. Project name and location.
b. Name of the Architect.
c. Project number.
d. Contractor's name and address.
e. Date of submittal.

2. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed; provide a line item and schedule value for each

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

a. Generic name.
b. Related Specification Section.
c. Name of subcontractor.
d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that have affected value.
g. Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent.

3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.

4. Round amounts off to the nearest whole dollar; the total shall equal the Contract sum.

5. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

6. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.

a. At the Contractor's option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense.

7. Schedule Updating: Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT:

A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Construction Manager and paid for by the Owner.

1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.

B. Payment Application Times: Each progress payment date is as indicated in the Agreement. The period of construction Work covered by each Application or Payment is the period indicated in the Agreement.

C. Payment Application Forms: Use AIA G-702 - Latest Edition.

D. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Contractor.

1. Entries shall match data on the Schedule of Values and Contractor's Construction

Schedule. Use updated schedules if revisions have been made.

2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

E. Transmittal: Please submit five (5) completed copies of the AIA G-702, Schedule of Values and Certificate of Payment. These forms may be xeroxed but the signatures of the Contractor's representative must be original. Page 2 of the Schedule of Values should be complete and, if applicable, the original signatures of the architect/engineer should be obtained before the schedule is submitted to the Owner.

F. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment (within 30 days of Notice to Proceed) include the following:

1. List of subcontractors.
2. List of principal suppliers and fabricators.
3. Schedule of Values.
4. Contractor's Construction Schedule (90-day) detailed-Schematic of Balance.
5. Schedule of principal products.
6. Schedule of unit prices.
7. Submittal Schedule. (preliminary, if not final).
8. List of Contractor's staff assignments and their resumes
9. List of Contractor's principal consultants.
10. Copies of building permits.
11. Copies of authorizations and licenses from governing authorities for performance of the Work.
12. Initial progress report.
13. Report of pre-construction meeting.
14. Certificates of insurance and insurance policies.
15. Performance and payment bonds.
16. Data needed to acquire Owner's insurance.
17. Initial settlement survey and damage report.

H. Second Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the second Application for Payment (within 45 to 60 days of Notice to Proceed).

1. Detailed CPM Schedule for entire project.

I. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portion of the Work.

J. Administrative actions and submittals that shall proceed or coincide with this application include:

1. Occupancy permits and similar approvals.
2. Warranties, guarantees, and maintenance agreements.
3. Test/adjust/balance records.
4. Maintenance instructions.
5. Meter readings.
6. Start-up performance reports.
7. Change-over information related to Owner's occupancy, use, operation and

maintenance.

8. Final Cleaning.
9. Application for reduction of retainage, and consent of surety.
10. Advice on shifting insurance coverages.
11. Final progress photographs.
12. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.

K. Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:

1. Completion of Project closeout requirements.
2. Completion of items specified for completion after Substantial Completion.
3. Assurance that unsettled claims will be settled.
4. Assurance that Work not complete and accepted will be completed without undue delay.
5. Transmittal of required Project construction records to Owner.
6. Certified property survey.
7. Proof that taxes, fees and similar obligations have been paid.
8. Removal of temporary facilities and services.
9. Removal of surplus materials, rubbish and similar elements.
10. Change of door locks to Owner's access.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 012900

SECTION 013000 – SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including;

1. Contractor's construction schedule
2. Submittal schedule
3. Project Submittals (Product Data, Shop Drawings, Samples, etc.)
4. Daily Construction Reports
5. Administrative Submittals: Refer to other Division-1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:

    a. Permits.
    b. Performance and Payment Bonds
    c. Insurance Certificates
    d. List of Subcontractors

B. The Schedule of Values submittal is included in Section 012900 "Applications for Payment."

1.3 SUBMITTAL PROCEDURES

A. Coordinate preparation and processing of submittals with the order of construction activities. Upload and transmit each submittal via e-mail sufficiently in advance of the performance of related construction activities to avoid construction delays. Timely submission of submittals shall be a condition for approval of all progress payments to the Contractor. All submittals required by Divisions 1-33 shall comply with the requirements of Division 1 including, but not limited to:

1. Schedule of Values
2. Project schedule and updates
3. Major subcontractors and suppliers' milestones
4. Submittal schedule

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

C. Coordinate submission of separate submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.

D. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

E. Processing:

1. Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for re-submittals
2. Allow fifteen (15) working days, exclusive of transit time, for initial review. Allow additional time if processing must be delayed permitting coordination with subsequent submittals. The Architect will promptly advise the Contractor when a submittal being processed must be delayed for coordination.
3. If subsequent submittals are necessary, process the same as the initial submittal.
4. Allow three weeks for reprocessing each submittal
5. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.

F. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Provide a space approximately 4" x 5" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
2. See General Conditions for information on label.

G. Submittal Transmittal:

1. Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Architect vie e-mail using a transmittal form. Each submittal must have a separate transmittal form. Multiple submittals received on one transmittal form will be returned unreviewed All submittals not in accordance with the requirements of this section will be immediately returned "Not Reviewed". Submittals received from sources other than the Contractor will be returned without action.

2. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

3. Substitutions must be clearly identified on submittal.

H. Submittal Timeline Requirements: The contractor shall transmit all submittals to the architect within ninety (90) calendar days after the issuance of the Notice to Proceed. The Owner shall have the right to withhold progress payments until all submittals are made.

I. Electronic (CAD) Files

1. The Architect will make electronic (CAD) files of the drawings available to the contractor under the following conditions:

   a. The contractor shall sign and abide by the architect’s Graphic Files Agreement. A copy of the agreement will be provided to the contractor upon request.
   b. The contractor shall pay the architect for the files as follows:

      1. The cost of preparing the CADD files for use by the Contractor requires that the Architect charge a nominal fee for their use. The following schedule is to be used to provide the Contractor with copies in one of two electronic formats:

1 to 10 drawings	$200.00 set-up charge + $25 per drawing

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

2. The cost of converting the CADD files from .dwg (native AutoCAD) to .dxf for use with other drafting programs is as follows:

1 to 500 drawings	$200.00 set-up charge + $5 per drawing

3. The cost of providing electronic file media, based on estimated cost of the media, is as follows:

CD	$200.00 set-up charge + $50 / CD

1.4 SUBMITTAL NAMING/NUMBERING CONVENTION

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

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

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

1.5 CONTRACTOR’S CONSTRUCTION SCHEDULE

A. See Section 013200 Construction Schedule for submittal requirements.

1.6 SUBMITTAL SCHEDULE

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

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

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

1.7 DAILY CONSTRUCTION REPORTS

A. Prepare a daily construction report, recording the following information concerning events at the site; Keep the daily construction reports in a binder in the project trailer and make available to the owner / architect when requested:

1. List of subcontractors at the site.
2. Approximate count of personnel at the site.
3. High and low temperatures, general weather conditions.
4. Accidents and unusual events.
5. Meetings and significant decisions.

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

1.8 SHOP DRAWINGS

A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered to be a Shop Drawing.

B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:

1. Dimensions.
2. Identification of products and materials included.
3. Compliance with specified standards. Notation of dimensions established by field measurement.

C. Submittal:

1. Submit one PDF file for the architect’s review. If the PDF is illegible, the entire submittal will be returned unchecked. The re-submittal will have the same review time as the contractor's original submittal. Once the architect has reviewed the submittal and all corrective actions have been made by the contractor the contractor shall submit 2 printed copies of the submittal to Arlington County for their records.

2. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

1.9 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."

B. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information.

1. Manufacturer's printed recommendations.
2. Compliance with recognized trade association standards.
3. Application of testing agency labels and seals.
4. Notation of dimensions verified by field measurement.

C. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

D. Environmental Requirement Verification: Submit verification (i.e. manufacturer's letter of certification, highlighted product information, independent test reports, etc…) as required by each specification section.

E. Material Safety and Data Sheets

1. Provide MSDS (Material Safety and Data Sheets) for all products submitted and used on the project.
2. Provide and highlight VOC information on all MSDS sheets and identify compliance with requirements.

1.10 SUBMITTALS:

A. Submit as required by 1.8.C above.

B. Distribution: Furnish copies of final submittal to installers, subcontractors, and suppliers required for performance of construction activities. Show distribution on transmittal forms.

C. Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession.

D. Do not permit use of unmarked copies of Product Data in connection with construction.

1.11 ARCHITECT'S ACTION

A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Architect will review each submittal, mark to indicate action taken, and return promptly.

B. Compliance with specified characteristics is the Contractor's responsibility.

C. Action Stamp: The Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

1. Where submittals are marked "Reviewed," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.

2. When submittals are marked "Furnish as Corrected, " that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.

3. When submittal is marked "Revise and Resubmit" or "Rejected," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.

3. Do not permit submittals marked "Rejected, Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.

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

1.12 SUBMITTAL REQUIREMENTS FOR COMMISSIONING

A. Data for Commissioning.

1. The Contractor will receive a written request from the Commissioning Authority requesting specific information needed about each piece of commissioned equipment or system.

2. Typically, this will include detailed manufacturer installation and start-up, operating, troubleshooting, and maintenance procedures, full details of any owner-contracted tests, fan and pump curves, full factory testing reports, if any, and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Commissioning Authority.

3. The Commissioning Authority may request further documentation necessary for the commissioning process.

4. This data request may be made prior to normal submittals.

5. Much of this information is contained in the regular O&M manual submittals normally submitted in the project. Typically, this information is required prior to the regular formal O&M manual submittals.

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

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 013000

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:

1. General coordination procedures.
2. RFIs.
3. Digital project management procedures.
4. Web-based Project management software package.
5. Project meetings.

B. Related Requirements:

1. Section 013233 "Project Reporting and Photographs" for preparing and submitting reports and photos.
2. Section 013200 "Construction Schedule" for preparing and submitting Contractor's construction schedule.
3. Section 015000 "Temporary Construction Facilities, Utilities and Controls" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
4. Section 017700 "Substantial Completion", 017800 “Closeout and Warranty Performance” and 017839 “As Built Documentation” for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. BIM: Building Information Modeling.

B. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.

2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 10 days of Notice to Proceed, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office and in the web-based Project software directory. Keep the list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Project closeout activities.

1.6 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
2. Owner name.
3. Owner's Project number.
4. Name of Architect.
5. Architect's Project number.
6. Date.
7. Name of Contractor.
8. RFI number, numbered sequentially.
9. RFI subject.
10. Specification Section number and title and related paragraphs, as appropriate.
11. Drawing number and detail references, as appropriate.
12. Field dimensions and conditions, as appropriate.
13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
14. Contractor's signature.
15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.

1. Attachments shall be electronic files in PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:
    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.

f. Requests for interpretation of Architect's actions on submittals.
g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log at each bi-weekly project meeting. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number, including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within three days if Contractor disagrees with response.

1.7 DIGITAL PROJECT MANAGEMENT PROCEDURES

A. Use of Architect's Digital Data Files: Digital data files of Architect's BIM model will be provided by Architect for Contractor's use during construction.

1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.
2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
3. Digital Drawing Software Program: Contract Drawings are available in REVIT BIM 360.
4. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.

a. Subcontractors and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of Agreement acceptable to Owner and Architect.

B. Web-Based Project Management Software Package: Contractor shall Provide and use a web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion.

1. Web-based Project management software includes, at a minimum, the following features:
   a. Compilation of Project data, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
   b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
   c. Document workflow planning, allowing customization of workflow between project entities.
   d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
   e. Track status of each Project communication in real time, and log time and date when responses are provided.
   f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
   g. Processing and tracking of payment applications.
   h. Processing and tracking of contract modifications.
   i. Creating and distributing meeting minutes.
   j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
   k. Management of construction progress photographs.
   l. Mobile device compatibility, including smartphones and tablets.

2. Provide up to ten Project management software user licenses for use of Owner, Architect, and Architect's consultants. Provide four hours of software training at Architect's office for web-based Project software users.
3. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.

C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:

1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of seven days prior to meeting.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: The Owner shall Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Contractor and Architect, but no later than 10 days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Responsibilities and personnel assignments.
    b. Tentative construction schedule.
    c. Phasing.
    d. Designation of key personnel and their duties.
    e. Lines of communications.
    f. Use of web-based Project software.
    g. Procedures for processing field decisions and Change Orders.
    h. Procedures for RFIs.
    i. Procedures for processing Applications for Payment.
    j. Preparation of Record Documents.
    k. Use of the premises and existing building.
    l. Work restrictions.
    m. Working hours.
    n. Responsibility for temporary facilities and controls.
    o. Construction waste management and recycling.
    p. Parking availability.
    q. Office, work, and storage areas.
    r. First aid.
    s. Security.
    t. Progress cleaning.

3. Meeting Notes: Entity responsible for conducting meeting will record and distribute meeting notes.

C. Project Closeout Conference: Contractor shall Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 15 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

    a. Preparation of Record Documents.
    b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    c. Procedures for completing and archiving web-based Project software site data files.
    d. Preparation of Contractor's punch list.
    e. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    f. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

D. Progress Meetings: Contractor shall conduct progress meetings at biweekly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

        1) Review schedule for next period.

    b. Review present and future needs of each entity present, including the following:
        1) Interface requirements.
        2) Sequence of operations.
        3) Status of submittals.
        4) Deliveries.

5) Access.
6) Site use.
7) Temporary facilities and controls.
8) Progress cleaning.
9) Quality and work standards.
10) Field observations.
11) Status of RFIs.
12) Status of Proposal Requests.
13) Pending changes.
14) Status of Change Orders.
15) Pending claims and disputes.
16) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION SCHEDULE

PART 1 - GENERAL

1.1 GENERAL SCHEDULING REQUIREMENTS

A. Pursuant to Article 4.11 of the General Conditions of this Contract, the following additional scheduling requirements are a part of this Contract.

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

C. Reporting Format

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

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL

A. The Construction Schedule shall be cost loaded and used as the basis for determining the Schedule of Values, Payment Schedule, and Progress Payments. The Owner shall be under no contractual obligation and shall have no responsibility to process Contractor's application for payment until the Contractor has submitted an acceptable Construction Schedule in accordance with the requirements of the Contract Documents.

B. The Contractor agrees to adjust network logic, activity sequences or inactivity durations subject to the A/E review and approval, including, but not limited to, adjustments as required to maintain progress to ensure completion within the Contract Time, and to absorb within his schedule slippages, delays, changes in sequence required by project conditions, labor inefficiency and resource unavailability subject only to any time extension justified under the Contract Documents.

C. The Contractor shall provide written documentation signed by all major Subcontractors and suppliers of the major equipment that demonstrates they concur with the elements of the Construction Schedule and will perform in accordance with it. The written documentation must be submitted with the schedule or immediately following execution of a contract with the Subcontractor and supplier of major equipment. Any modifications to the schedule which impacts major Subcontractors and equipment suppliers must also be accompanied by written documentation signed by the major Subcontractors and equipment suppliers which demonstrates that they concur with the updated schedule and will perform in accordance with it.

D. Float or slack is defined as the amount of time between the early start date and the late start date or the early finish date and the late finish date of any of the activities in the Construction Schedule. Float or slack is not time for the exclusive use or benefit of either the Owner or the Contractor. Use of float suppression techniques such as preferential sequencing or logic, special lead/lag logic restraints, unspecified milestones, and extended activity times are prohibited, and use of float time disclosed or implied by use of alternative float-suppression techniques shall be shared to the benefit of Owner and Contractor. Use of such float suppression techniques shall be cause for rejection of the schedule and any revisions or updates.

E. The schedule shall clearly identify the critical path activities leading to the Substantial Completion and Final Completion dates as set forth in the Contract Documents. If the schedule indicates an earlier completion date than that set forth in the Contract Documents, the difference between the Schedules and the Contract Document dates shall be considered to be part of the total float available. This float is a resource available to both the Owner and the Contractor and may not be used as a basis of claim by the Contractor for additional compensation for actual project completion after the early completion schedule date but before the Substantial Completion or Final Completion dates.

F. The schedule as developed shall show the sequence and interdependence of activities required for complete performance of the work. The Contractor shall be responsible for ensuring all work sequences are logical and the schedule shows a coordinated plan of the work.

G. Failure by the Contractor to include any element of work required for performance of the Contract or failure to properly sequence the work shall not excuse the Contractor from completing all work within the Contract Time.

H. The work shall be executed at such a rate as will ensure meeting the specified Substantial Completion date in the Contract. By execution of the Contract, the Contractor represents it has analyzed the work, the materials and methods involved, the systems of the building, availability of qualified labor, restrictions of the site, constraints imposed, workload and capacity to perform the work, and agrees that the specified times are reasonable considering the existing conditions prevailing in the locality of the work, including weather conditions, and other factors, with reasonable allowance for variations from average or ideal conditions.

I. The Substantial Completion date provided is considered essential to the satisfactory performance of the Contract and to the coordination of all work on the project. The Owner reserves the right to require the Contractor to execute the work in accordance with the specified Substantial Completion dates.

J. The Contractor is to provide the operations, manpower, resources, materials, and all items and work necessary to complete the work and meet the Substantial Completion and Final Completion dates provided. The Contractor understands and agrees that: the Substantial Completion, Final Completion, actual start and completion dates, rate of progress, and coordination are essential conditions of this project. The Contractor must include in this schedule any contractual special conditions including, but not limited to, phased work, work restrictions/access/shift work, and work being performed by separate

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

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

3.2 PRELIMINARY CONSTRUCTION SCHEDULE

A. The Contractor shall submit a Preliminary Construction Schedule within 15 calendar days after the Notice of Award.

B. The Preliminary Construction Schedule is required before the start of construction activities and shall consist of four (4) prints of a Network Diagram and two (2) sets of the program data files on an electronic exchange media such as a compact disk. The Contractor's Submittal shall indicate which days of the week will be planned work days and the dates of all scheduled non-work days.

C. The Preliminary Construction Schedule shall depict major components of the Work and the sequence relations between major components and subdivisions of major components with further detail/attention to construction and procurement activities to be performed or which are being performed during the first 90 days of the project.

D. The Preliminary schedule shall include those activities that are necessary to properly indicate:

1. The approach to the overall Work. The Work for each phase or area must be represented by a least one Summary Activity, such that the activities cumulatively indicate the entire Construction Schedule.
2. Summary Activities shall be replaced and expanded with detailed activities when the Preliminary Schedule is incorporated into the Construction Schedule.

E. The schedule shall be computerized and presented in the form of bar charts and shall consist of horizontal lines, or bars plotted along a daily time scale. The horizontal bars shall indicate the start and finish dates for each work activity depicted.

F. The Preliminary Construction Schedule will be superseded upon approval of the Construction Schedule described below.

G. The Owner, A/E, and Contractor shall meet within ten (10) days of receipt of the Contractor's proposed Preliminary Schedule for a joint review and any correction or adjustment of the proposed Interim Schedules. Acceptance by the Owner of the Contractor's Preliminary Schedule creates neither a warranty, expressed or implied, nor acknowledgement of admission of the reasonableness of the activities, logic, durations, manpower or cost loading the Interim Schedule.

3.3 CONSTRUCTION SCHEDULE

A. The Contractor shall submit a detailed Construction Schedule within 30 calendar days of the Notice to Proceed. If the Construction Schedule is not submitted in a complete and acceptable manner by the next payment application the Owner shall be under no contractual obligation and shall have no responsibility to process Contractor's application for payment until the Contractor has submitted an acceptable schedule in accordance with the requirements of the Contract Documents.

B. The Construction Schedule shall consist of two parts: a computer-drawn time-scaled network diagram and a computer-generated network analysis or printout. The submission shall include four (4) prints of the Network Diagram, four (4) sets of computer produced Schedules and Reports, and two (2) sets of the program data files on an electronic exchange media such as a compact disc. The Construction Schedule shall cover the entire Contract Time and include all revisions reviewed and accepted by the Owner. Each major component and subdivision component shall be accurately plotted on time scale sheets on reproducible paper not to exceed 30 inches by 42 inches in size.

C. The initial Construction Schedule submittal shall reflect the Contractor's plan for the performance of all of the Work as of the date of the Notice to Proceed and shall not reflect the actual progress of any of the Work. The Contractor's Construction Schedule shall consist of but not be limited to the following:

1. Procurement Activities, including preparation and review of submittals, ordering, manufacturing, fabrication, and delivery of long-lead equipment or materials, and any required off-site testing by the Owner or A/E. Long-lead items include equipment or materials requiring more than one month between ordering and delivery to the job site.
2. Construction Activities, including A/E review of samples, mock-ups, curing, code enforcement inspections, and required testing and/or commissioning.
3. The Construction Schedule shall indicate the sequence of the Work and the time of starting and completing each activity.

D. All restraints and contract milestones shall be clearly indicated in the Construction Schedule. The Construction Schedule shall be used as the basis for reporting progress, schedule controlling and schedule forecasting, as required herein, and shall be sufficiently detailed so as to allow the Owner to evaluate the Contractor's planned schedule and to monitor Contractor's Progress on a day-to-day basis during performance.

E. The Construction Schedule as approved shall be the Baseline Schedule against which all progress shall be measured. It shall be used by the Contractor and the A/E as the basis for evaluating changes and claims and, in conjunction with the schedule of values, for evaluation of the Application for Payment. The Schedule of Values (Article 9.2 of the General Conditions) and the Payment Schedule (Article 9.6.3 of the General Conditions) shall be developed using the values indicated in the Construction Schedule as a guideline.

F. Should A/E or Owner reject Contractor's Construction Schedule, or any subsequent update or revision, as not being in accordance with the Contract Documents, Contractor shall, within fourteen (14) calendar days of receipt of the A/E's rejection, make the changes or revisions required to conform to the Contract Documents, or as directed by Owner should A/E and Contractor not agree to the revisions required.

G. Activity Depiction

1. Activity numbers shall be unique and shall not change as revisions are made to the schedule.
2. Activity shall have a concise description of the Work represented by the activity. The Work related to each activity shall be limited to one work trade and one construction area.
3. Activities shall be cost loaded to show its dollar value as a part of the whole.
4. The durations of activities shall be expressed in whole working days, with no single activity in excess of fourteen (14) calendar days or a value exceeding $25,000 without prior acceptance of the A/E or Owner. Non-construction activities such as concrete curing, mobilization, shop drawings and sample submittals, fabrication of materials, and delivery of materials and equipment, may have values in excess of fourteen (14) calendar days and values over $25,000 unless otherwise directed by the A/E.
5. Activities shall be assigned separate activity codes to create a Work breakdown structure and, as a minimum, shall include:

a. An activity code (maximum five characters) to define specific performance responsibility by discipline or Subcontractor as acceptable to the A/E. All abbreviations shall be fully described in a legend attached to the Construction Schedule.
b. An activity code (maximum five characters) to define concise Work area (e.g., floor or elevation, location of yard piping, location of site electrical, paving locations). All abbreviations shall be fully described in legend attached to the Construction Schedule. As requested by the Owner or A/E, either prior or subsequent to the acceptance of the Construction Schedule, the Contractor shall provide, without additional cost to the Owner, on prints of the Contract Drawings graphic illustrations of the relationships of construction activities to intended Work areas as identified by the Contractor.
c. An activity code (maximum five characters) to identify the project phase of each activity as it relates to the phases identified in these documents.
d. An activity code (maximum five characters) to identify the Structure or building as defined on the contract drawings.
e. An activity code (maximum five characters) to identify the Specification for the activity.

H. The Construction Schedule shall indicate that the project will begin on the date given in the Notice to Proceed and will be completed within the number of calendar days specified in the Contract Documents.

I. The Contractor shall ensure that the schedule represents an accurate, efficient, reasonable, and feasible plan and method for accomplishing the Work throughout the time of performance. While the owner and A/E will review the Construction Schedule, the schedule itself is the Contractors' who has full responsibility for its preparation, content, revisions and updating in accordance with the requirements of the Contract Documents.

J. It is to be expressly understood and agreed by the Contractor that the Owner does not guarantee that Contractor can start work activities on the "early start" or "late start" date or complete work activities on the "early finish" or "late finish" date shown in the baseline schedule, or any subsequent updates or revisions. If Contractor's schedule indicates that Owner or a separate Contractor is to perform an activity by a specific date, or within a certain duration, Owner or any separate Contractor under contract with Owner shall not be bound to said date or duration unless Owner expressly and specifically agrees in writing to same; the Owner's or A/E's overall review and approval or acceptance of the schedule does not constitute any agreement to specific dates or durations for activities or the Owner of any separate Contractor.

K. The construction schedule shall indicate the following:

1. Procurement activities such as submittals and fabrication for critical materials and equipment.
2. Off-site activities.
3. Inspections, start up, testing and balancing, mobilization, and demobilization.
4. Interfaces with the work of outside Contractors such as utility companies.
5. Description of activity and activity number.
6. Planned and remaining duration time for each activity.
7. Early start date for each activity.
8. Late start date for each activity.
9. Early finish date for each activity.
10. Late finish date for each activity.
11. Float available for each path of activities containing float.
12. Actual start date for each activity begun.
13. Actual finish date for each activity completed.
14. Identification of all critical path activities in the network analysis.

15. The critical path for the project, with said path of activities being clearly and easily recognizable on the time-scaled network diagram. The relationship between all non-critical activities and activities on the critical path shall be clearly shown on the network diagram.
16. The percent complete of each activity in progress or completed.

L. The Contractor shall submit a narrative report with the Construction Schedule indicating anticipated allocation of the following resources and work shifts to be utilized on the project:

1. Labor resources;
2. Equipment resources;
3. Whether work will be performed on a shift basis and whether it is to be done on a 5-, 6- or 7-day work week.

M. Monthly anticipated adverse weather days as established in General Conditions, Article 8.6, TIME EXTENSIONS FOR WEATHER, shall be considered and included in the planning and scheduling of all-weather affected Work activities in order to complete all Work within the Contract Time.

N. Custom calendars should be developed by the Contractor to identify the differing holiday, weather, workweek, and other work calendars on which specific work activities will be performed. Each activity should be assigned to the calendar corresponding with its work activity, weather, or season.

O. The Owner, A/E, and the Contractor shall meet, within 20 days of receipt by the Owner of the Contractor's proposed Construction Schedule, to perform a joint review of, and make corrections or adjustments to the proposed Construction Schedule. If the A/E or Owner questions the Contractor's proposed activities, logic, or durations, the Contractor shall, within seven (7) days of receipt of any A/E or Owner request, provide a satisfactory revision to or adequate justification for such to the A/E and Owner. The A/E or Owner may at any time as part of its review, acceptance and subsequent monthly updating process, request that additional details be included in the Construction Schedule. The Contractor shall, at no additional cost, provide the details requested to the satisfaction of A/E and Owner. In the event the Contractor fails to define any element of work, activity or logic, such omission or error, when discovered, shall be corrected by the Contractor in the next monthly Construction Schedule Update without effect on the Contract Time. Within fourteen (14) days after the joint review between the Contractor, A/E, and Owner, the Contractor shall revise the Construction Schedule in accordance with agreements reached or direction given during the joint review and submit diagrams, printouts and electronic copies as already specified. Acceptance by the Owner of the Contractor's Construction Schedule does not relieve the Contractor of any of his responsibility whatsoever for the accuracy or feasibility of the Construction Schedule, or of the Contractor's ability to meet Substantial Completion and Final Completion requirements of the Contract, and such acceptance also creates neither a warranty, expressed or implied, nor an acknowledgement or admission of the practicability of the Contractor's Construction Schedule.

3.4 NETWORK DIAGRAM REQUIREMENTS

A. The Network Diagram shall be computer generated, in a time scaled format, on sheets no larger than 30" X 42" and no smaller than 11" x 17", printed in color, and with font sizes no smaller than 8 point.

B. The Network Diagram shall be organized by grouping activities related to specific phases or areas of the Project together for ease of understanding and simplification.

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

1. Activity number
2. Description of Work

3. Activity duration
4. Designation of critical path where applicable.

3.5 COMPUTER PRODUCED SCHEDULE REPORT REQUIREMENTS

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

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

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

3.6 UPDATES

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

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

B. Progress Reports

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

1. The progress of the Contract Work, whether in the mills, shops, or in the field, stating the existing status, rate of progress, estimated time of completion and cause of delays, if any.

2. Description of work accomplished since submission of previous progress schedule and work planned during the next period.
3. Comparison of the actual status of the Work with Contractor's Construction Schedule as previously submitted to the A/E or as previously updated or revised in accordance with the review of the Owner.
4. Status of equipment and materials deliveries and shop drawing preparation and review.
5. Changes or additions to Contractor's supervisory personnel since the preceding progress report.
6. Causes of any delays.
7. Changes in logic, sequence, or durations or activities and the reasons, therefore.
8. Actions proposed by Contractor to restore schedule (including what is being done, or is planned to be done, in problem areas).
9. What problems or changes are anticipated or expected by Contractor and what is Contractor's plan to deal with same so as to minimize or prevent any delay to completion.
10. Changes in the Payment Schedule.

C. Neither the updating or revision of Contractor's Construction Schedule nor the submission, updating, change or revision of any report or schedule submitted to A/E by Contractor under the Contract nor Owner's review or non-objection of any such report or schedule shall have the effect of amending or modifying, in any way, the Contract Time, any Contract Completion Date, or Contract Milestone Dates or of modifying or limiting in any way Contractor's obligations under this Contract.

3.7 REVISIONS

A. If, as a result of the monthly construction schedule update, it is the opinion of the A/E and Owner that the Construction Schedule no longer represents the actual planned prosecution and the actual progress of the Work, the A/E or Owner may request that the Contractor revise the Construction Schedule to reflect its current planning. The Contractor shall submit to the A/E and Owner in writing, a schedule analysis illustrating the influence, if any, of the proposed schedule revision on Contract Time. Each such schedule analysis shall be submitted to the satisfaction of the A/E and Owner prior to the next Construction Schedule Update. Compliance with such submittal requirements shall be a condition precedent to any obligation of the Owner to consider any Application for Payment.

B. If the schedule update indicates that the Substantial Completion date will be later than that required by the Contract the Contractor shall be required to prepare a Schedule Recovery Plan for regaining the time that the Project is behind schedule. The Schedule Recovery Plan shall be submitted within five (5) working days and should indicate in both narrative form and in a detailed time-scaled bar chart schedule with logic the following information:

1. Amount of time the activity is late.
2. Reason for lateness
3. Proposed method for recovering the time and achieving any/all required project Substantial Completion deadline(s).

C. The Contractor may also request reasonable revisions to the Construction Schedule in the event that its planning for the Work is revised. If the Contractor desires to make changes in the Schedule to reflect revisions in its planned methods of operating and scheduling of the Work, the Contractor shall notify the A/E and Owner in writing, stating the reason for the proposed revisions and submit to the A/E and Owner a schedule analysis illustrating the influence, if any, of the proposed schedule revision on Contract Time. Each such schedule analysis shall demonstrate how the Contractor would incorporate the proposed schedule revision into the Construction Schedule. The schedule analysis shall demonstrate the time impact of the proposed schedule revision to be initiated, reflecting the projected status of the Work at that point in time, and provide the event time computations of all affected activities if the proposed

revisions were to be accepted by the A/E and Owner. Accepted revisions will be incorporated into the Construction Schedule at the next monthly Construction Schedule Update Meeting.

3.8 REQUESTED TIME ADJUSTMENT SCHEDULE

A. If Contractor believes he is entitled to an extension of the Contract Time under the Contract documents, Contractor shall submit to A/E and Owner as a Proposed Change Order (PCO), a separate schedule analysis (entitled "Requested Time Adjustment Schedule") indicating suggested adjustments in the Contract Time which should, in the opinion of the Contractor, be made in accordance with the Contract Documents due to changes, delays, or conditions which are expected or contemplated by Contractor (whether such conditions are excusable under the Contract or are due to Contractor fault). This separate schedule shall be time-scaled utilizing a computer generated and computer-drawn network analysis schedule and shall be accompanied by a formal time extension request as required by the Contract Documents and a detailed narrative justifying the time extension requested.

B. Time extensions for weather delays during a given month will be allowed only for actual work days in excess of those numbers provided by General Conditions Article 8.6, TIME EXTENSIONS FOR WEATHER, and only when those excess days of delay affect the current critical path(s) leading to the specified Substantial Completion or Contract Completion dates.

C. The time adjustment request shall include schedule forecasts that predict the proposed Project Completion Date and a forecast of the achievement of milestones listed in the Owner-Contractor Agreement.

D. The "Requested Time Adjustment Schedule" shall clearly and accurately reflect Contractor's actual intention and proposed time adjustments as of the latest update. It shall also reflect any adjustments made by Contractor in the logic, sequence or duration of any activities in the Construction Schedule, and any time extensions previously granted by Owner, along with actual and expected progress.

E. Owner shall not have any obligation to consider any time extension request unless the requirements of the Contract Documents, and specifically, but not limited to these requirements, are complied with; and Owner shall not be responsible or liable to Contractor for any constructive acceleration due to failure of Owner to grant time extensions under the Contract Documents should Contractor fail to substantially comply with the submission requirements and the justification requirements of this Contract for time extension requests. Contractor's failure to perform in accordance with the Construction Schedule shall not be excused, nor be chargeable to Owner, because Contractor has submitted time extension requests.

F. Extensions of time for performance as described in the Contract Documents will be granted only to the extent that time adjustments for the activity or activities affected exceed the total float along the path of activities affected at the time of Notice to Proceed of a change order or the commencement of any delay or condition for which an adjustment is warranted under the Contract Documents.

G. Change Orders: If an extension or contraction of any milestone or completion date is authorized by a change order issued by the A/E and Owner the Contractor shall revise his Construction Schedule, milestone, and completion dates accordingly. Any and all activities impacted by a change to the milestone or completion date shall likewise be adjusted to reflect the revised requirements.

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

3.9 TWO-WEEK LOOK AHEAD SCHEDULE

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

END OF SECTION 013200

SECTION 013233 - PROJECT REPORTING AND PHOTOGRAPHS

PART 1 - GENERAL

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

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PRE-CONSTRUCTION PHOTOGRAPHS

A. The Contractor shall be responsible for the production of pre-construction photographs prior to start on any work on-site. Pre-constructionphotographs shall document the condition of all existing surface features and structures within the project limits. The Contractor shall provide pre-construction photographs via CD in these areas prior to commencement of work.

B. The Contractor is to identify all photographs with project name, Contractor's name, Project Number, Contract Number, date taken, and view/vantage point.

3.2 DAILY FIELD REPORTS

A. The Contractor shall submit, in a format acceptable to the Owner, a Daily Field Report for all Contractor and Subcontractor activities for each day of the Contract from NTP to Substantial Completion. Each report shall be received by the Owner and AE no later than three calendar days after the date to which the report pertains. Each report shall contain the following data:

1. Project Name, Project Number, and Contract Number.
2. The number of workers (by trade and company) and the hours worked by each worker.
3. Work being performed, referenced to work location and associated CPM activity number(s).
4. Weather
5. Situations or circumstances which could delay work or give cause for claims for extension of time or added cost.
6. Name and affiliation of all visitors to the site. Record their observations and/or reason for the site visit.
7. Equipment utilized or on site and idle. Provide the serial numbers or other identifying features and hours worked for each piece of equipment utilized on that day.
8. Report on any recordable or reportable safety issues.
9. Report on any quality issues discovered or corrected.

B. Non-Compliance - Failure to complete and submit the required reports may have an impact on approval of the Contractor's monthly payment application.

3.3 MONTHLY PROGRESS REPORTS

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

3.4 PROGRESS PHOTOGRAPHS

A. Progress photographs shall be furnished by the Contractor in digital format, acceptable to the Owner, with sufficient pixilation to allow enlargement without noticeable loss of resolution.

B. Depending on the size of the project and at the discretion of the Owner/Architect, a minimum of twelve (12) to a maximum of twenty-five (25) progress photographs shall be taken each month and shall be submitted with each Application for Payment (i.e. on or about the first day of each month) until project Substantial Completion.

C. Photographs shall be taken from the same interior and exterior vantage points as directed by the Owner/Architect. Photos shall not be edited, modified, or enhanced in any way without the Owner's advanced approval in writing.

D. The Contractor shall transmit these photographs via CD (one for Owner and one for Architect) with each month's Application for Payment. The Contractor is to identify all photographs with project name, Contractor's name, Project Number, Contract Number, date taken, and view or vantage point.

3.5 OTHER REPORTS

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

END OF SECTION 013233

SECTION 013523 - SAFETY AND SECURITY

PART 1 - GENERAL

1.1 DESCRIPTON

A. Furnish all labor, materials, tools, equipment and services for effective project safety and security operations to meet all regulatory requirements in accordance with applicable codes and contract provisions.

B. The Contractor is to furnish and install any supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a safe and secure project operation. The types of security and protection provisions required include, but are not limited to worker PPE, fire protection, barricades, warning signs/lights, site enclosure fence, sidewalk bridges, building enclosure/lockup, 24/7 site access control, environmental protection, and similar provisions intended to minimize property losses, personal injuries and claims for damages at the project site. No part of such provision(s) shall become the subject of a claim for extension of time or for excess costs or damages by the Contractor.

C. The Contractor is required to submit a project/site specific safety and security plan to the Owner for review/approval no later than the earlier of thirty (30) calendar days after Notice to Proceed or mobilization to site.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 SAFETY STANDARDS

A. The Contractor shall comply with Federal, State, and local safety and fire codes and regulations and the applicable provisions of the following:

1. Occupational Safety and Health Standards issued by the Secretary of Labor pursuant to the Williams-Steiger Occupational Safety and Health Act of 1970 and as amended.
2. Virginia Occupational Safety and Health Standards for the construction industry.
3. NFPA 70 E – Standards for Electric Safety at Workplace as referenced in OSHA 29 CFR 1926, sub-part K for safety measures, PPE protection from arc flash from electric equipment.

B. Where requirements conflict, the most stringent requirement shall apply.

3.2 ACCIDENT REPORTS

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

3.3 PERSONAL PROTECTIVE EQUIPMENT AND EMPLOYEE IDENTIFICATION

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

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

1. Hard Hat.
2. Safety Glasses.
3. Safety Vest.
4. Safety toe footwear.

B. Hard hats shall be required at the construction site from start to completion of Work. Each Contractor, employee, and visitor at the construction site shall be required to wear a hard hat. The Contractor shall provide hard hats for visitors as necessary and shall enforce the wearing of hard hats by Contractor employees and visitors. Individuals found not wearing hard hats will not be permitted to remain on site. The Contractor shall be responsible for advising all individuals who will be working on the site of this requirement.

C. All Contractor and Subcontractor employees are required to provide employee and company identification on their hard hats or shall carry a separate ID card.

3.4 HOUSEKEEPING

A. The Contractor shall, at all times, keep the site and surrounding property clean and free of unnecessary and hazardous debris. Any damage to surrounding property shall be repaired upon notification by the Owner at no expense to the Owner.

B. The Contractor shall provide all items required to ensure safety of individuals and property on site.

3.5 FIRE PROTECTION

A. The Contractor is responsible for compliance with OSHA requirements and local fire codes and regulations as enforced by the governing Fire Marshall or his designated representative. Attention should be called, but not limited to, the following:

5. Proper storage and removal of volatile waste
6. Proper storage of bottled gasses
7. On-site storage of fuels
8. Establishment of smoking areas
9. Placement of temporary portable fire extinguishers
10. Employee training

C. Adequate precautions against fire shall be taken throughout all operations. Flammable material shall be kept at an absolute minimum and shall be properly handled and stored. Fires or open salamanders shall not be permitted in any part of the Work

D. Construction practices, including cutting and welding and protection during construction, shall be in accordance with the published standards of the National Fire Protection Association.

E. Store gasoline and other flammable liquids in Underwriters Laboratories-listed safety containers in conformance with the National Board of Fire Underwriters recommendations. Storage, however, shall not be within a building.

F. Make arrangements for periodic inspection of all construction areas by local fire protection authorities and insurance underwriters. Cooperate with these authorities and promptly carry out their recommendations.

3.6 HAZARDOUS MATERIALS

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

3.7 POLLUTION CONTROL

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

3.8 SECURITY

A. The Contractor is responsible for overall security of the construction site. This includes but is not necessarily limited to:

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

END OF SECTION 013523

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

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

1.3 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform duties of Contractor.

E. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.4 SPECIAL TESTS AND INSPECTIONS

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

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures, and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

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

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 015000 - TEMPORARY CONSTRUCTION FACILITIES, UTILITIES AND CONTROLS

1.1 REQUIREMENTS

A. Although such work is not specifically indicated, furnish, and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure, and complete installation.

B. Site Utilization Plan - Prior to the start of work and no later than 30 days after Notice to Award the Contractor shall submit a Site Utilization Plan for Owner review/approval. The plan shall show the locations and dimensions of any area(s) to be fenced and used by the Contractor, the number of trailers and/or sheds to be used, any equipment and material storage areas, access and haul routes, any areas to be graveled, construction entrance(s), trash dumpsters, temporary sanitary facilities, worker parking, project sign, and project bulletin board.

C. Community Impact - The Contractor shall schedule operations with a minimum of disruption of affected, or neighboring, properties during construction. Consideration shall be given to property access, driveway maintenance, parking, pedestrian traffic, and overall public safety to the maximum extent possible. The Contractor shall abide by all governing ordinances in effect at the job site at the time of construction.

1.2 TEMPORARY UTILITY SERVICES

A. All utility service accounts whether for temporary or permanent service shall be in the name of the Contractor until the date of Substantial Completion.

B. Electricity - The Contractor shall furnish and install all temporary electrical facilities as required and shall arrange and pay for all electrical usage until date of Substantial Completion. All temporary facilities shall remain the property of the Contractor and be removed after permanent connections have been completed. Electrical wiring, conduit or equipment which are part of the permanent electrical systems shall not be used for temporary electrical facilities unless specifically approved by the Owner. The Contractor shall be responsible for any damage to equipment and materials, or injury to personnel caused by temporary electrical installations. Costs for materials and installation of temporary electrical facilities shall be at the Contractor’s expense.

C. Water - The Contractor shall make all arrangements to install and pay for all temporary equipment, piping, water meters and outlets for an adequate supply of clean water for construction purposes until date of Substantial Completion. Point of tie-in, meter(s) and hose bibs shall be indicated on the site utilization plan. Contractor shall furnish drinking water for all Contractor and Owner personnel.

D. Telephone - The Contractor shall make arrangements for and pay all costs associated with telephone service for the temporary site office(s).

E. Toilets - The Contractor shall provide temporary toilet facilities for the use of Contractor and Owner personnel. Facilities shall comply with local and State sanitary laws and OSHA regulations. The Contractor shall be responsible for maintaining such facilities in a clean, sanitary condition (including provision of adequate supplies of toilet paper and hand sanitizer) throughout the duration of the construction contract.

F. Heat

1. The Contractor, at his expense, shall furnish, install, and maintain temporary heat and enclosures during contract activities and shall, as applicable, provide heat for specific operations as follows:

a. At all times during placing, setting, and curing of concrete and masonry, provide sufficient heat to insure heating of all surrounding spaces involved to not less than 50 degrees F or as specified in the technical specifications.
b. From beginning of application of plaster and during the setting and curing period, provide sufficient heat to produce a temperature in spaces involved of not less than 50 degrees F or as specified in the technical specifications.
c. For a period of ten (10) days prior to placing interior finishes, and until final acceptance of work or until full occupancy by Owner, provide sufficient heat to produce a temperature in spaces involved of not less than 50 degrees F or as specified in the technical specifications.
d. For a period of forty-eight (48) hours previous to installation of floor finishes, provide sufficient heat to produce a temperature of not less than 70 degrees F; maintain this temperature during installation and maintain 55 degrees F temperature for at least 48 hours after installation or as specified in the technical specifications.
e. Maintain such heat as practicable to provide satisfactory working conditions for all trades.

2. The Contractor, at his cost, shall provide heat, enclosures, fuel, and services to protect all work and materials against damage from dampness and cold until final acceptance of all work and materials in the Contract, unless the building is occupied by Owner prior to such acceptance.
3. If the Contractor desires operation of the permanent heating system to properly proceed with work, he shall request permission of Architect/Owner in writing. If permission is granted, the Contractor shall accept full responsibility for damage or undue wear to the system and that the one-year warranty will not begin until final acceptance of the project by the Owner.
4. The use of open salamanders and other temporary heating devices which cause smoke and damage will not be permitted. Fuel, equipment, and method of heating shall be satisfactory to the Architect and meeting all regulatory requirements.

1.3 TEMPORARY CONTROLS

A. General

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

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

C. Dust Control

1. Dust shall be kept down at all times, including non-working hours, weekends, and holidays. Soil at the site, haul roads, and other areas disturbed by the Contractor's operations and materials stockpiled for the project shall be treated with dust suppressors or covered to control dust. No dry power brooming will be permitted. Vacuuming, wet mopping, wet sweeping, or wet power brooming shall be used instead. Air blowing will be permitted only for cleaning off non-particle debris, such as that from reinforcing bars. Only wet cutting of concrete block, concrete, and asphalt will be permitted.
2. The Contractor shall comply with applicable provisions of the National Emission Standards for Asbestos (40 CFR 61 Subpart B).

3. The Contractor shall inspect vehicles for dirt prior to their leaving the construction site. Dirt, soil, and rubble likely to be dislodge during transit shall be removed from the trucks and other vehicles prior to leaving site.
4. The Contractor shall ensure that material that may become airborne is covered during transport to and from the site. Dump trucks hauling material from the construction site shall be covered with an appropriate covering device.

D. Water Control

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

E. Pollution Control

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

1.4 BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY BOARD

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

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

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

1.5 PROTECTION AND MAINTENANCE OF TRAFFIC

A. Except as otherwise specifically directed by the Owner, the Contractor shall maintain and protect traffic on all affected roads during the construction period to ensure the traveling public is protected from damage to person or property. Measures for the protection, maintenance, and diversion of traffic shall meet all the requirements of VDOT and Fairfax County. The Contractor shall be responsible to submit a Maintenance of Traffic (MOT) Plan to VDOT for approval prior to any work in the VDOT right-of-way. The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with public traffic. The Contractor shall investigate the adequacy of existing roads, the allowable load limit on these roads, and be responsible for the repair of any damage to roads caused by construction operations.

B. Access Roads - The Contractor shall provide and maintain temporary access to the building site and will accomplish this per methods as approved by the Architect and the Owner so as not to interfere with work of others. When this access is no longer required the Contractor will be responsible for restoration to original or final design state.

C. Dust, Dirt, and Mud Control - At all points where vehicles leave the project site and enter adjacent paved streets, the Contractor shall maintain a wash rack installation and crew to prevent any mud from being carried onto such adjacent paved streets. The Contractor is responsible for daily cleanup of all debris, materials, etc. that fall from vehicles entering or leaving the site.

D. Barricades - The Contractor shall erect and maintain temporary barricades to limit public access to hazardous areas. The barricades shall be securely placed, clearly visible, and have adequate illumination to provide sufficient visual warning of the hazard during both day and night.

1.6 TEMPORARY OFFICE FACILITIES

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

1.7 TEMPORARY SITE PARKING

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

1.8 TEMPORARY CONSTRUCTION AIDS

A. Construction Elevators and Hoists - The Contractor shall provide cranes, hoists, towers and other lifting devices for proper and efficient movement of materials and shall provide properly trained and licensed operating personnel for the equipment. Equipment shall be provided with guys, bracing, and other safety devices in accordance with local and Commonwealth of Virginia codes. Remove towers and hoisting equipment when no longer needed or as directed. All lifting devices and hoisting facilities must be approved by Fairfax County prior to use on the job site.

B. Scaffolding and Platforms - Provide, erect, maintain, and remove when directed, all scaffolding, staging, platforms, temporary runways, temporary flooring, guards, railings, stairs, etc., as required by local agencies having jurisdiction for protection of workmen and public. Construction inspection and maintenance of these items shall comply with all safety codes and regulations as applicable to the project.

C. Temporary Fences and Barricades - The Contractor shall furnish, install, and maintain all necessary temporary fences, barricades, trench and hole covers, warning lights and all other safety devices necessary to prevent injury to persons and damage to property. The Contractor shall furnish, install, and maintain all temporary barricades at the excavations of the building and openings through floor slabs. The Contractor shall secure the site with a temporary six foot (6'-0") chain link fence and a minimum of two gates for security and safety purposes. This fence should be indicated on the Site Utilization Plan for Owner approval. Contractor shall maintain ownership of the fence and remove it upon completion of the project. Any adjustment to the fence or gate locations during construction to facilitate site access or construction operations will be done at no additional cost to the Owner.

D. Temporary Pumping - The Contractor shall provide all temporary pumping and dewatering necessary for Contract performance.

1.9 TEMPORARY ENCLOSURES

A. General Contractor shall furnish and install temporary enclosures, doors and transparent plastic windows required to protect building from damage due to vandalism, or the elements, or to maintain suitable temperature during installation or finishing work.

B. Provide all items required to ensure safety of individuals on site.

1.10 CLEANUP

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 015000

SECTION 016310 - PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling requests for substitutions made after award of the Contract.

B. The Contractor's Construction Schedule and the Schedule of Submittals are included under Section "Submittals."

C. Standards: Refer to Section "Definitions and Standards" for applicability of industry standards to products specified.

D. Procedural requirements governing the Contractor's selection of products and product options are included under Section "Materials and Equipment."

1.3 DEFINITIONS

A. Definitions used in this Article are not intended to change or modify the meaning of other terms used in the Contract Documents.

B. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions." The following are not considered substitutions:

1. Substitutions requested by Bidders during the bidding period, and accepted prior to award of Contract, are considered as included in the Contract Documents and are not subject to requirements specified in this Section for substitutions.
2. Revisions to Contract Documents requested by the Owner or Architect.
3. Specified options of products and construction methods included in Contract Documents.
4. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.4 SUBMITTALS

A. Substitution Request Submittal: Requests for substitution will be considered if received within 60 days after award of contract. Requests received more than 60 days after award of contract may be considered or rejected at the discretion of the Architect and Owner.

1. E-mail each request for substitution for consideration to the Owner and the Architect. Submit requests in the form and in accordance with procedures required for Change Order proposals.
2. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the

following information, as appropriate:

a. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
b. Samples, where applicable or requested.
c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors, that will become necessary to accommodate the proposed substitution.
e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
f. Cost information, including a proposal of the net change, if any in the Contract Sum.
g. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time, that may subsequently become necessary because of the failure of the substitution to perform adequately.

3. Architect's Action: Within ten days of receipt of the request for substitution, the Architect will request additional information or documentation necessary for evaluation of the request. Within three weeks of receipt of the request, or one week of receipt of the additional information or documentation, which ever is later, the Architect will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name. Acceptance will be in the form of a Change Order.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Conditions: The Contractor's substitution request will be received and considered by the Architect when one or more of the following conditions are satisfied, as determined by the Architect; otherwise requests will be returned without action except to record noncompliance with these requirements.

1. Revisions to Contract Documents are not required.
2. Proposed changes are in keeping with the general intent of Contract Documents.
3. The request is timely, fully documented and properly submitted.
4. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
5. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
6. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Architect for redesign and evaluation services, increased cost of

other construction by the Owner or separate Contractors, and similar considerations.

7. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
8. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provide the required warranty.
9. The Contractor shall provide appropriate credit for substitute material, equipment, labor etc. if the substitution is acceptable to the Architect, Engineer and County.

B. The Contractor's submittal and Architect's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 016310

SECTION 017329 - CUTTING AND PATCHING

PART 1 – GENERAL

1.1 QUALITY ASSURANCE

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

B. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.

C. Operational Limitations: do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.

D. Visual Requirements: Do not cut and patch construction exposed on exterior or in occupied spaces in a manner that would, in the Architect's opinion, reduce the building's aesthetic or visual qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction that was cut and patched in a visually unsatisfactory manner.

E. Warranty or existing warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

1.2 DESCRIPTION

A. Install Work in such a manner and sequence as to preclude or minimize cutting and patching of new Work.

B. Execute cutting (including excavation), fitting or patching of Work, required to:
   1. Make several parts fit properly.
   2. Uncover Work to provide for installation of ill-timed Work.
   3. Remove and replace defective Work.
   4. Remove and replace non-conforming Work.
   5. Remove samples of installed Work for testing.
   6. Install specified Work in existing construction.
   7. Provide rerouting penetrations of non-structural surfaces for installation of piping and electrical conduit.
   8. Patch and repair fireproofing damaged after installation of other Work or demolition activities.
   9. Remove and finish construction at connections to other structures.
   10. Remove existing materials where required by new Work, and patch to match existing adjacent materials to remain.

C. Do not endanger any Work or any Work of other Contractors, by cutting, excavating, or otherwise altering any Work except with written consent of Contractor subject to review by Architect.

D. Do not cut into or cut away any structural concrete or other structural members or other concrete, and do not dig under any foundations or into structural walls or other parts, or in any case do not allow same to be done without full knowledge and written consent of Architect.

E. Correct damage resulting from violation of these provisions.

F. Use only firms or individual trades qualified to perform Work required under this Section.

1.3 JOB CONDITIONS

A. Before start of Work, obtain and pay for all permits required by all authorities having jurisdiction and notify all interested utilities companies.

B. Obtain approval of Owner and authorities having jurisdiction for Work which affects existing exitways, exit stairs, means of egress, or access to, or exit from, areas. Review with and obtain approval of authorities for any temporary construction that affects such areas.

C. Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

E. Avoid cutting existing utilities, pipe, conduit or ductwork serving the building but scheduled to be removed or relocated until alternate provisions have been provided.

F. Items to be salvaged and delivered to Owner shall be carefully removed and properly stored in an area easily accessible for removal by Owner.

1.4 PAYMENT FOR COSTS

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

PART 2 - PRODUCTS

1.5 MATERIALS - GENERAL

A. Use materials identical to existing materials.

B. For exposed surfaces, use materials that visually match existing adjacent surfaces or use materials that visually match existing adjacent surfaces to the fullest extent possible if identical materials are unavailable or cannot be used.

C. Use materials whose installed performance will equal or surpass that of existing materials.

D. Where applicable, comply with specifications for type of Work to be performed.

PART 3 - EXECUTION

1.6 INSPECTION

A. Prior to the bid, Contractor shall review all existing facilities that are related to this contract and shall be familiar with all utility requirements and construction.
Existing facility documents may be available through the Owner for review.

B. Perform preliminary investigations as required to ascertain extent of Work.
Conditions that would be apparent by such investigation will not be allowed as cause for claims for extra costs.

C. Inspect existing conditions for work, including elements subject to movement or damage during:
1. Cutting and patching.
2. Excavating and backfilling.

D. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.

E. Before proceeding, meet at Project Site with parties involved in cutting and patching, including mechanical and electrical trades.
1. Review areas of potential interference and conflict.
2. Coordinate procedures and resolve potential conflicts before proceeding.

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

1.7 PREPARATION PRIOR TO CUTTING

A. Provide adequate shoring, bracing and support as required to maintain structural integrity of Project.

B. Provide protection for other portions of Project that may be affected.

C. Provide protection from adverse weather conditions.

1.8 CUTTING AND REMOVAL - GENERAL

A. Execute fitting and adjustment to provide finished installation to comply with specified tolerances and finishes.

B. Execute cutting by methods that will prevent damage to existing or other Work and will provide proper surfaces to receive installation of new Work.

C. Perform backfilling as specified in applicable sections.

D. Neatly cut and remove materials, and prepare all openings to receive new work.

E. Remove masonry or concrete in small sections.

F. Provide shoring, bracing, and other supports to prevent movement, settlement, or collapse of remaining or adjacent wall areas, structure, or facilities.

G. Arrange shoring, bracing, and supports to prevent overloading of structure.

H. Take all precautions necessary to prevent damage to existing remaining work or to adjacent facilities.

I. Execute Work using methods that will prevent interference with use of remaining and adjacent facilities by Owner.

J. Remove existing work indicated to be removed, or as necessary for installation of new Work.

K. Provide for cutting, fitting, repairing, patching and finishing of Work disturbed by installation of new Work.

L. Do not remove or damage fireproofing materials.
   1. Install hangers, inserts, supports, and anchors prior to installation of fireproofing.
   2. Repair or replace fireproofing damaged.

1.9 CUTTING IN CONCRETE CONSTRUCTION

A. Do not cut into nor core drill openings or holes in beams, joists, and columns without prior written approval of Architect. When written approval is obtained, comply with additional requirements and instructions of Architect.

B. In members other than beams, joists, and columns; where an opening larger than 10 inches in any dimension is required, or where dimension between 2 openings in less than 2 times maximum dimension of largest opening, and condition is not shown on architectural or structural drawings, obtain prior written approval of Architect.
   1. At floor slabs and walls to be core drilled or cut, contractor shall find and mark all reinforcing in both faces located by means of x-ray, pach-ometer, or prof-ometer. Submit sketch showing location of rebar and proposed cuts or cores for review.
   2. When written approval is obtained, comply with additional requirements and instructions of Architect.

1.10 CUTTING IN POST TENSIONED CONCRETE CONSTRUCTION

A. Do not cut into nor core drill openings or holes in beams or joists.

B. Do not cut into nor core drill openings or holes in slabs without prior written approval of Architect. When approval is obtained, comply with additional requirements and instructions of Architect.

C. Openings not greater than 6 inches in any dimension are permitted in flat slab portions of construction except that such openings shall not interfere with or disturb strands. Do not place closer than 12 inches to any column face, or closer than 24 inches to any post tensioning strand anchor.

1.11 CUTTING IN PRECAST/PRESTRESSED CONCRETE CONSTRUCTION

A. Do not cut openings or core drill vertically or horizontally through stems of members.

B. Openings smaller than 6 inches diameter or 6 inches maximum dimension may be cut in flanges of units after obtaining prior written approval of Architect. When approval is obtained, comply with instructions of Architect.

1.12 CUTTING IN STEEL FRAME AND METAL DECK CONSTRUCTION

A. Do not cut nor drill holes in webs and flanges of columns, beams, purlins, and joists without prior written approval of Architect. When approval is obtained, comply with requirements and instructions of Architect and provide reinforcing at such locations when required.

B. When openings are cut into metal decks having cast-in-place concrete slab over metal deck:
   1. No reinforcing of holes is required for circular openings or sleeves up to 6 inches diameter and for rectangular openings having no side dimension greater than 6 inches.
   2. Reinforce openings greater than 6 inches.
   3. Obtain prior written approval of Architect for openings not shown on architectural or structural drawings. Comply with additional requirements and instructions of Architect.

C. When openings are cut into metal roof decks that have lightweight insulating cementitious roof fill or no concrete cast-in-place over deck:
   1. No reinforcing of holes is required for circular openings less than 6 inches diameter and for rectangular openings having no side dimension greater than 6 inches.
   2. Reinforce openings between 6 inches and 12 inches, with 20 Gauge flat steel sheet 12 inches greater in dimension than opening; fusion weld to top surface of deck at each corner and on each side midway between corners.
   3. Do not cut openings greater than 12 inches without prior written approval of Architect. Comply with requirements and instruction of Architect.

1.13 MATCHING AND PATCHING

A. Where items are removed from existing walls, ceilings, floors or partitions to remain, repair wall, ceiling, floor or partition disturbed by removal.

B. Where walls, ceilings, floors or partitions are removed, repair abutting walls, ceilings or floors disturbed by removal.

C. Where existing construction is cut, removed or otherwise disturbed to permit installation of new Work, match and patch existing disturbed construction.

D. Use methods and materials similar in appearance, and equal in quality to areas or surfaces being repaired.

E. Restore Work that has been cut or removed; install new products to provide completed Work in accord with requirements of Contract Documents.

F. Patch Work must in every way possible match existing work and adjacent surfaces.

G. Re-finish entire surfaces as necessary to provide an even finish to match adjacent finishes.

1. Continuous surfaces: To nearest intersections.
2. Assembly: Entire refinishing.

H. In existing areas remove and replace existing ceilings and finishes for installation of Work, if not shown to be removed on Architectural Drawings and Schedules.
1. If existing ceiling cannot be satisfactorily reinstalled, replace with like materials and construction.
2. Replace damaged construction with like materials.

END OF SECTION 017329

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous demolition and construction waste.
2. Recycling nonhazardous demolition and construction waste.
3. Disposing of nonhazardous demolition and construction waste.

B. Related Requirements:

1. Section 311000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.

C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner’s property.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 MATERIALS OWNERSHIP

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

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

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

1.5 ACTION SUBMITTALS

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

1.6 INFORMATIONAL SUBMITTALS

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

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

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

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

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

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

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

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

1.7 QUALITY ASSURANCE

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

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

1.8 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work in compliance with Section 024116 "Structure Demolition" and section 024119 "Selective Demolition."
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.
7. Salvage the following – See list of items to be salvaged in the contract drawings.

   Notify Cynthia Connolly – Special Projects Curator, Arlington Cultural Affairs at 703-228-0818. Allow three weeks after notification for pick-up of the salvage material. The material should be stored in an accessible, secure, weather-protected area for pick-up. Salvaged items that are not collected by Cynthia Connolly shall be taken to adjacent property located at 3700 S Four Mile Run Drive – 1st level.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."

B. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

A. Comply with requirements in Section 024116 "Structure Demolition" and Section 024119 "Selective Demolition" for salvaging demolition waste.

B. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

C. Salvaged Items for Sale and Donation: Permitted on Project site.

D. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area on-site designated by Owner at 3700 S Four Mile Run Drive, 1st Level.
5. Protect items from damage during transport and storage.

E. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

F. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

G. Plumbing Fixtures: Separate by type and size.

H. Lighting Fixtures: Separate lamps by type and protect from breakage.

I. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

    a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor as often as required to prevent overfilling bins.

3.4 RECYCLING DEMOLITION WASTE

A. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.

B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum 4-inch size.
2. Crush concrete and screen to comply with requirements in Section 312000 "Earth Moving" for use as satisfactory soil for fill or subbase.

C. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

1. Pulverize masonry to maximum 1-1/2-inch size.

2. Clean and stack undamaged, whole masonry units on wood pallets.

D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

E. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

F. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

G. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.

H. Metal Suspension System: Separate metal members, including trim and other metals from acoustical panels and tile, and sort with other metals.

I. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.

1. Store clean, dry carpet and pad in a closed container or trailer provided by carpet reclamation agency or carpet recycler.

J. Carpet Tile: Remove debris, trash, and adhesive.

1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by carpet reclamation agency or carpet recycler.

K. Piping: Reduce piping to straight lengths and store by material and size. Separate supports, hangers, valves, sprinklers, and other components by material and size.

L. Conduit: Reduce conduit to straight lengths and store by material and size.

M. Lamps: Separate lamps by type and store according to requirements in 40 CFR 273.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

D. Paint: Seal containers and store by type.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. General: Except for items or materials to be salvaged or recycled, remove waste materials and legally dispose of at designated spoil areas on Owner's property.

C. Burning: Do not burn waste materials.

END OF SECTION 017419

SECTION 017700 - SUBSTANTIAL COMPLETION

PART 1 - GENERAL

1.1 The Contractor is to furnish all labor, materials, and data necessary to achieve substantial completion in accordance with applicable Contract provisions.

1.2 Impacts resulting from the Contractor's failure to meet Substantial Completion per Contract requirements shall in no part become the subject of a claim for extension of time or for excess costs or damages by the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PREREQUISITES

A. The Contractor shall have completed all of the following items of work prior to requesting the Owner's Substantial Completion Inspection:

1. Obtain a Non-Residential Use Permit for the Project or designated portion thereof.
2. Equipment Demonstration and Owner Personnel Instruction.
3. Maintenance Materials, Specialty Tools and Spare Parts

    a. The Contractor shall provide any "special" or "proprietary" tools which may be required for general maintenance and service of equipment and systems.
    b. In addition to the requirements of the technical specification sections the Contractor is to provide all materials, spare parts, tools, and "attic supplies" necessary for general operations and maintenance during the warranty period. Such items shall be packed in boxes clearly identifying:

        I. The trade name and stock number
        II. Where item material is to be used
        III. The name, address and phone number of closest supplier
        IV.

4. Operation/Maintenance and Warranty Manuals (ref Specification 017823)
5. If required by Contract, submission of LEED Certification Documentation (as detailed in Division 1 of the project specifications).

    a. LEED documentation collected by the Contractor shall be assembled in a 3-ring binder in a format similar to the requirements for Operation/Maintenance and Warranty Manuals.
    b. All LEED information shall be submitted two weeks prior to the date of Substantial Completion.

6. Submission of As-Built drawings and specifications (ref Specification 017839)
7. Submission of certificate of final inspection from city, county and/or state agencies in accordance with applicable codes, laws, and ordinances to include but not limited to:

    a. VDOT
    b. Contractor's Certified Arborist, if one is required
    c. Fire Marshal
    d. For projects subject to the Arlington County Special Inspections program, assure that the Special Inspections Engineer of Record has completed the Final Report of Special Inspections prior to seeking final building inspection.

8. Final Cleaning

   a. All items/surfaces shall be free of stains, dirt, damage, labels, foreign materials or other defects
   b. Wash, sweep, polish or vacuum all finished wall surfaces, floors, windows, hardware, mirrors, lighting fixtures and items of equipment
   c. Replace damaged or defaced items and re-clean items not acceptable to Owner/Architect
   d. As appropriate broom clean exterior paved surfaces and rake clean other surfaces within the limits of the project site
   e. As appropriate, clean ducts, blowers, coils, and replace air conditioning filters in all operating HVAC system(s)
   f. Remove any remaining waste, surplus materials and/or rubbish from the site
   g. Reference individual technical specifications for additional cleaning requirements
   h. Final cleaning operations are to be conducted by a company experienced and licensed in such a service. Owner/Architect shall have right of review/approval of the cleaning subcontractor.
   i. Coordinate cleaning materials/methods with the LEED requirements specified elsewhere.

9. Submission of a Non-Use of Asbestos Affidavit.
10. Submission of final reports to the Owner/Architect for the testing, adjusting and environmental systems including, but not limited to: air distribution systems, hot water heating systems, chilled water systems, condenser water systems and the equipment and apparatus connected thereto.
11. Demonstration in the Owner's off-site location that the Building Automation System graphics have been installed and that the systems can be remotely controlled/monitored. For the purpose of obtaining Substantial Completion, the Commissioning Agent shall verify the graphics and remote control are functional and that all systems are in general conformance with contract requirements. Note that detailed commissioning on a seasonal basis may not be complete at this time.
12. All commissioning functional testing shall be completed satisfactorily prior to the issuance of substantial completion.

3.2 REQUEST FOR SUBSTANTIAL COMPLETION INSPECTION

A. Upon completion of the Pre-Requisites for Substantial Completion the Contractor shall:

   1. Submit written certification to the Owner that the Project, or, subject to Owner approval, a designated portion of the Project, is substantially complete
   2. Submit a listing to the Owner/Architect of all items yet to be completed or to be corrected. If the Owner/Architect determines that the list of such items is incomplete or too extensive, the Owner reserves the right to delay the substantial completion inspection. Such delay shall have no cost impact to the Owner.

B. Substantial Completion Inspection should start no later than five (5) working days after the Contractor's request and Owner/Architect concurrence of readiness. Inspection shall be made with representatives of the Contractor and the Owner/Architect.

   1. Should the joint inspection find that work is substantially complete the Owner/Architect shall prepare a punch list of items to be completed or corrected by the Contractor in conformance with the Contract documents.
      The final punch list shall also include those items from all city, county and/or state agencies including but not limited to those identified in 3.1.A.7 above.
   2. Should the joint inspection find that work is not substantially complete:
      a. The Owner/Architect shall immediately notify the Contractor accordingly and follow up such notice in writing stating the reasons. In order to expedite the completion process a punch list of

items to be completed or corrected may be also issued at this time. The Contractor shall complete all items on this punch list within forty five (45) calendar days after issuance and send a second written notice to the Owner certifying that the Project, or subject to Owner approval, a designated portion of the Project, is substantially complete.

b. Owner/Architect shall schedule a second inspection.

3.3 ISSUANCE OF CERTIFICATE OF SUBSTANTIAL COMPLETION

A. The Architect shall prepare and issue a Certificate of Substantial Completion, AIA G704, for the signatures of Owner and Contractor, accompanied by a list of items remaining to be completed or corrected.

B. The Contractor shall have thirty (30) calendar days after the established date of Substantial Completion to complete all items on the final punch list. The Owner shall have the option to correct or conclude by others any punch list item not completed by the Contractor by the 45th day. The cost of the work by others shall be deducted from the final payment to the Contractor.

C. If the Contractor completes all items of work on the final punch list within the specified forty five (45) calendar days the date of the Certificate of Substantial Completion shall be the date from which all warranties and guarantees commence.

D. If all items are not complete within forty five (45) calendar days, then all warranties and guarantees required in these specifications will become effective upon issuance of final payment for the project. It shall also state the responsibilities of the Owner and the Contractor for security, maintenance, heat, utilities, damage to the work, and insurance.

E. The issuance of the Certificate of Substantial Completion does not indicate final acceptance of the project by the Owner and the Contractor is not relieved of any responsibility for the project except those outlined in the document.

END OF SECTION 017700

SECTION 017800 - CLOSE-OUT AND WARRANTY PERFORMANCE

PART 1 - GENERAL

1.1 The Contractor is to furnish all labor, materials, and data necessary to support project close-out activities in accordance with applicable Contract provisions.

1.2 Impacts resulting from the Contractor's failure to achieve timely close-out shall in no part become the subject of a claim for extension of time or for excess costs or damages by the Contractor.

1.3 RELATED SPECIFICATION SECTIONS

A. Section D General Conditions

B. 017839 As-Built Documentation

C. 017700 Substantial Completion

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 FINAL INSPECTION

A. The Contractor shall request final inspection once all Contract work has been confirmed as complete. Completion of work shall also include those items identified from all city, county and/or state agencies including but not limited to those identified in Section 017700 paragraph 3.1.A.7.

B. Final Inspection should occur no later than ten (10) working days after the Contractor's request and Owner/Architect concurrence of readiness. Inspection(s) shall be made with representatives of the Contractor, state and local agencies and the Owner/Architect.

C. Should the joint Final Inspection find that work is not complete:

1. The Owner/Architect shall immediately notify the Contractor accordingly and follow up such notice in writing stating the reasons. In order to expedite the completion process, a punch list of items to be completed or corrected may be also issued at this time. The Contractor shall complete all items on this punch list within Seven (7) calendar days after issuance and send a second written notice to the Owner certifying that the Project is complete. The Owner has the right to complete any items not completed within time frames stated above and deduct all related costs from the Contract.
2. Owner/Architect shall schedule a second inspection.

3.2 FINAL APPLICATION FOR PAYMENT

A. Prior to submitting the Request for Final Payment, the Contractor shall submit the "Contractors Certificate of Final Completion" and all documents required therein. See Appendix A for a copy of the required Certificate.

B. When the Owner/Architect notifies the Contractor that they find the work acceptable under the Contract documents and the Contract fully performed, and the Contractor has satisfactorily submitted the "Contractors Certificate of Final Completion" and all documents required therein, he may submit a Final Certificate for Payment.

3.3 WARRANTY PERFORMANCE

A. The Contractor's Performance Bond shall remain effective throughout the life of all warranties and warranty extensions. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the Owner will have the work performed by others, and after completion of the work, will charge any remaining contract funds for expenses incurred by the Owner while performing the work, including, but not limited to administrative expenses. In the event sufficient funds are not available to cover the construction warranty work performed by the Owner at the Contractor's expense, the Owner will have the right to recoup expenses from the Contractor's Bonding Company.

B. Following oral or written notification of the required construction warranty repair work, the Contractor shall respond within one working day of his intentions/actions in pursuit of the warranty repair. The Owner will follow any oral instructions with written verification. Failure of the Contractor to respond will be cause for the Owner to proceed against the Contractor.

C. Warranty Repair Priority

1. The severity of the warranty issue will be evaluated by the Owner and a Response Priority assigned to the notice as followings:
   a. First Priority Code 1 – Contractor to provide on-site inspection to evaluate the situation and determine the course of action within four (4) hours, initiate the work within six (6) hours and work continuously to completion or relief.
   b. Second Priority Code 2 – Perform on-site inspection to evaluate the situation and determine the course of action within eight (8) hours, initiate the work within 24 hours and work continuously to completion or relief
   c. Third Priority Code 3 – Necessary work to be initiated within three working days and work performed during standard work hours each subsequent day to completion or relief.

D. Contractor's Response to Construction Warranty Requirements

1. Following the oral or written notification by the Owner, the Contractor shall respond to construction warranty service requirements in accordance with the assigned Response Priority code. The Contractor shall submit a report within seven (7) calendar days after completion of activities on any warranty item that has been repaired during the warranty period. The report shall include:
   a. The cause of the problem
   b. The date/time reported
   c. The assigned Response Priority Code
   d. Corrective action taken
   e. When repairs were completed

E. If the Contractor does not perform the construction warranty items within the time frames specified above, the Owner retains the right to perform the work and recover all costs from the Contractor.

END OF SECTION 017800

SECTION 017839 - AS-BUILT DOCUMENTATION

PART 1 - GENERAL

1.1 The Contractor is to furnish all labor, materials, and data necessary to maintain and produce project As-Built drawings and specifications in accordance with applicable Contract provisions.

1.2 Impacts resulting from the Contractor's failure to meet As-Built requirements shall in no part become the subject of a claim for extension of time or for excess costs or damages by the Contractor.

1.3 The terms 'drawings", "contract drawings", "drawing files", "working as-built drawings", and "final as-built drawings" all refer to contract drawings which are revised to be used for final as-built drawings.

1.4 RELATED SPECIFICATION SECTIONS

A. Section B GENERAL CONDITIONS
B. Section 017700 SUBSTANTIAL COMPLETION
C. Section 017800 CLOSE-OUT AND WARRANTY PERFORMANCE

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 AS-BUILT POSTING DURING CONSTRUCTION

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

3.2 PAYMENT

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

3.3 CONTENT

A. The As-Built packages shall be submitted as follows:

1. As-Built Site Plan

a. The Contractor shall submit an as-built site plan prepared by a licensed Land Surveyor or licensed Professional Engineer, for review, and obtain approval by local authorities having jurisdiction for conformance with the approved site plan. Submission shall be one (1) mylar transparency and seven (7) black line printed copies and one (1) electronic copy. The as-built site plan shall be in accordance with the requirements of the Arlington County Zoning Ordinance for As-Built Site Plans. The Contractor shall pay any required filing, correction, and resubmission fees at no additional cost to the Owner. Notify the Owner in writing when plan is submitted and when the local authorities have approved the submission.

b. The Contractor shall confirm all project required storm sewer systems are properly installed and acceptable to the Owner prior to the site as-built submission. The Contractor shall video all pipes, structure, and other system components and obtain approval from the Owner for the storm sewer systems. The Contractor shall provide the Owner with two copies of the final approved videos on disk for all storm sewer components.
c. Submission information should minimally include the following:
   1) Boundary of the site
   2) Dimensional location/size of all building(s)
   3) All storm sewer, sanitary sewer, and fire hydrants, showing pipe sizes,
   4) lengths, top and invert elevations and percent of slope of pipe
   5) Deed book and page number of any dedication and all easements
   6) Location and cross-sectional survey of any storm water or bio retention areas(s)
   7) Certification by the engineer or surveyor indicating that the as-builts conform with the approved site plan except as shown and that it represents the actual conditions on the site, and bearing his signature and Virginia Registration Number
   8) Curb and gutter and/or ditch elevations
   9) Survey and record topographic elevations for all paving, sidewalks, stairs, ramps, and entrances to verify conformance with contract requirements. The County will use this specific information to confirm ADA accessibility for the site.
   10) Any other pertinent information as determined by the Owner/Architect

2. Sanitary Sewer As-Built Plan

   a. The Contractor shall submit a separate sanitary sewer as-builts for review and obtain approval by local authorities having jurisdiction. Submission shall be one (1) mylar transparency, seven (7) black line printed copies and one (1) electronic copy. The sanitary sewer as-built plan shall be in accordance with the requirements of the Arlington County Public Facilities Manual-Sanitary Sewer As-Built Plans. The Contractor shall pay any required filing, correction, and resubmission fees at no additional cost to the Owner. Notify the Owner in writing when plan is submitted and when the local authorities have approved the submission.
   b. The Contractor is responsible to confirm all required sanitary sewer systems are properly installed and acceptable to the Owner prior to the sanitary sewer as-built submission. The Department of Public Works, Line Maintenance Division, shall video the sanitary sewer system to determine acceptability. The Contractor shall correct any and all deficiencies found in during this or other inspections at no cost to the Owner.

3. Project Record As-Built Plans

   a. The Contractor shall submit two paper sets and two (2) electronic copies of red-lined Contract drawings and specifications for review and approval of the Owner/Architect. The documents should be marked to reflect actual civil, architectural, structural, electrical, plumbing, mechanical, and other trades final as-built conditions of the project.
   b. Label each set of documents “RECORD AS-BUILTS”. Have skilled draftspersons and typists transfer all changes, corrections, and entries.
   c. Submission information should minimally include the following:
      1) Changes in details of design or additional information obtained from working drawings and specifications including but not limited to fabrication, erection, material changes/substitutions, installation plans and placing details, etc.
      2) Where contract drawings or specifications present options, only the option selected for construction shall be shown.
      3) Changes or modifications resulting from the substantial completion or final inspections.
      4) Changes or modifications brought about as a result of a Request for Information, Architect’s Supplemental Instructions, Field Order, or Change Order.

5) Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
6) Final location and depth of all utilities on the property.
7) Field changes of dimension and/or detail.

END OF SECTION 017839

SECTION 024116 - STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

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

B. Related Requirements:

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

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store. Include fasteners or brackets needed for reattachment elsewhere.

1.4 MATERIALS OWNERSHIP

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

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

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

1.5 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

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

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Engineering Survey: Submit engineering survey of condition of building.

C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

1. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain including means of egress from those buildings.

D. Schedule of Building Demolition Activities: Indicate the following:

1. Detailed sequence of demolition work, with starting and ending dates for each activity.
2. Temporary interruption of utility services.
3. Shutoff and capping of utility services.

E. Predemolition Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by salvage and demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before the Work begins.

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

1.7 CLOSEOUT SUBMITTALS

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

1.8 QUALITY ASSURANCE

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

1.9 FIELD CONDITIONS

A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.

B. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.

1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.

a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.

C. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

D. Hazardous Materials: Hazardous materials are present in the existing building. The contractor shall remove and dispose of all hazardous materials in accordance with all federal state and local laws.
1. The extent of the hazardous materials is outlined in the attached documents:
a. Report dated 11/11/2021 by JSK Environmental Services, LLC, titled "PRE-DEMOLITION LIMITED REGULATED HAZARDOUS MATERIALS SURVEY REPORT FOR WAREHOUSE BUILDING, ARLINGTON COUNTY 2700 NELSON STREET ARLINGTON, VIRGINIA 22206."
2. Hazardous material remediation is specified elsewhere in the Contract Documents.
3. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.

E. On-site storage or sale of removed items or materials is not permitted.

1.10 COORDINATION

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

2.2 SOIL MATERIALS

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.

D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.

E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

F. Inventory and record the condition of items to be removed and salvaged.

3.2 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

B. Salvaged Items: Comply with the following:

1. Clean salvaged items of dirt and demolition debris.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to storage area designated by Owner.
5. Protect items from damage during transport and storage.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Utilities to be Disconnected: Locate, identify, disconnect, and seal or cap off utilities serving buildings and structures to be demolished.

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

3.4 PROTECTION

A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.

B. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of demolition.

C. Existing Utilities to Remain: Maintain utility services to remain and protect from damage during demolition operations.

1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.

a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.

D. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Section 015000 "Temporary Facilities and Controls."

1. Protect adjacent buildings and facilities from damage due to demolition activities.
2. Protect existing site improvements, appurtenances, and landscaping to remain.
3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
5. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
6. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
7. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.

E. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.5 DEMOLITION, GENERAL

A. General: Demolish indicated buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
2. Maintain fire watch during and for at least 1 hours after flame-cutting operations.
3. Maintain adequate ventilation when using cutting torches.
4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed trafficways if required by authorities having jurisdiction.
2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

C. Explosives: Use of explosives is not permitted.

3.6 DEMOLITION BY MECHANICAL MEANS

A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.

B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.

C. Below-Grade Construction: Demolish foundation walls and other below-grade construction.

1. Remove below-grade construction, including basements, foundation walls, and footings, completely.

D. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures within the building footprint and beyond to the extent shown.

E. Hydraulic Elevator Systems: Demolish and remove elevator systems, including cylinder, plunger, well assembly, steel well casing and liner, oil supply lines, and tanks.

3.7 SITE RESTORATION

A. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with according to backfill requirements in Section 312000 "Earth Moving."

B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.8 REPAIRS

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

3.9 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Do not burn demolished materials.

3.10 CLEANING

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

1. Clean roadways of debris caused by debris transport.

END OF SECTION 024116

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.

B. Related Requirements:

1. Section 011100 "Summary of Work" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

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

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

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

1.5 PREINSTALLATION MEETINGS

A. Pre-demolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and for noise control. Indicate proposed locations and construction of barriers.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

C. Pre-demolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before Work begins.

1.7 CLOSEOUT SUBMITTALS

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

1.8 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

1. Before selective demolition, Owner will remove the following items:

a. All furniture and equipment.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: Hazardous materials are present in the existing building. The contractor shall remove and dispose of all hazardous materials in accordance with all federal state and local laws. The extent of the hazardous materials is outlined in the attached documents:

1. Report dated 11/11/2021 by JSK Environmental Services, LLC, titled “PRE-DEMOLITION LIMITED REGULATED HAZARDOUS MATERIALS SURVEY REPORT FOR WAREHOUSE BUILDING, ARLINGTON COUNTY 2700 NELSON STREET ARLINGTON, VIRGINIA 22206”

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.

D. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.

1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.3 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch, as required by Owner, after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

C. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.8 SELECTIVE DEMOLITION SCHEDULE

A. See Demolition drawings.

END OF SECTION 024119

SECTION 061023 – MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

This Section includes the following:

1. Wood grounds, nailers, and blocking.
2. Wood furring interior and exterior.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Material certificates for dimensional lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use as well as design values approved by the Board of Review of American Lumber Standards Committee.

C. Wood treatment data, including chemical treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material.

1. Warranty of chemical treatment manufacturer for each type of treatment.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.

1. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

A. Lumber Standards: Furnish lumber manufactured to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

B. Grade Stamps: Provide lumber with each piece factory-marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

C. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.

1. Provide dressed lumber, S4S, unless otherwise indicated.
2. Provide seasoned lumber with 19 percent maximum moisture content at time of dressing and shipment for sizes 2 inches or less in nominal thickness, unless otherwise indicated.

D. All exterior wood (blocking and nailers, etc.) shall be pressure treated.

2.2 LUMBER

A. Exterior framing, blocking, equipment cribbing, roof cants: No. 2 dimension Southern Yellow Pine.

B. Interior furring, framing, blocking: No. 2 dimension Southern Yellow Pine.

C. Telephone and equipment mounting panels: CD Int APA, 3/4 in. thick.

1. Interior: Grade A exposed and Grade D concealed American Plywood Association Standards (APA).

2.3 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of AISI Type 304 stainless steel.

B. Nails, Wire, Brads, and Staples: ASTM-C 514

C. Power Driven Fasteners: National Evaluation Report NER-272.

D. Wood Screws: ANSI B18.6.1.

E. Lag Bolts: ANSI B18.2.1.

F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and where indicated, flat washers.

2.4 PRESERVATIVE WOOD TREATMENT BY PRESSURE PROCESS

A. General: All exterior lumber or plywood shall be preservative-treated wood to comply with applicable requirements of AWPA Standards C2 (Lumber) and C9 (Plywood). Mark each treated item with the AWPB or SPIB Quality Mark Requirements.

B. Pressure-treat above-ground items with water-borne preservatives to a minimum retention of 0.25 pcf. For interior uses, after treatment, kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19 percent and 15 percent. Treat indicated items and the following:
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood floor plates installed over concrete slabs directly in contact with earth.

C. Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces to comply with AWPA M4. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of rough carpentry construction and that are too small to use in fabricating rough carpentry with minimum joints or optimum joint arrangement.

B. Set rough carpentry to required levels and lines, with members plumb and true to line and cut and fitted.

C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated.

E. Countersink nail heads on exposed carpentry work and fill holes.

F. Use common wire nails, unless otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.

3.2 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

A. Install wood grounds, nailers, blocking, and sleepers where shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

B. Install blocking to attach upper casework. See drawings for cabinet locations. Coordinate with casework man for installation.

C. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

3.3 WASTE MANAGEMENT

A. Separate wood waste in accordance with the waste management plan.

B. Separate the following categories for salvage or reuse on site:

1. Sheet materials larger than 2 Sq. Ft.
2. Framing members larger than 16"
3. Multiple offcuts of any size larger than 12"

C. The following categories may be used in the manufacture of particle board or medium density fiberboard:

1. Composite wood (for example, plywood, OSB, LVL, I-Joist, Parallel strand, laminated strand, MDF, particle-board.
2. Clean dimensional lumber

D. Set aside damaged wood for acceptable alternative uses; for example, use as bracing, blocking, cripples or ties.

E. Do not burn Lumber.

F. Separate the following categories for disposal and place in designated areas for hazardous materials.

1. Treated, stained, painted or chemically contaminated wood.

G. Sequence the work to minimize the use of temporary HVAC to dry out building and control humidity.

END OF SECTION 061000

SECTION 076200 - FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Metal counter flashing and base flashing.
2. Formed low-slope roof sheet metal fabrications: Copings, Downspouts, Scuppers and Conductor Heads.

B. Roofing accessories installed integral with roofing membranes are specified in roofing system sections as roofing work (except counter flashing).

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data, Flashing, Sheet Metal, and Accessories: Manufacturer's technical product data, installation instructions and general recommendations for each specified sheet material and fabricated product.

C. Samples of the following flashing, sheet metal, and accessory items:

1. 8-inch-square samples of specified sheet materials to be exposed as finished surfaces.

D. Shop drawings showing layout, profiles, methods of joining, and anchorages details, including major counter-flashings, copings, downspouts, and scuppers. Provide layouts at 1/4-inch scale and details at 3-inch scale.

1.4 PROJECT CONDITIONS

A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. Stainless steel: 0.025” (24 GA.) ASTM A240 Type 304.

1. Provide stainless steel for concealed flashings. Provide hemmed drip edge where through wall flashing penetrates the outer wythe of masonry.

B. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet in accordance with ASTM A653/A653M, G90 coating designation or aluminum-zinc alloy-coated steel sheet in accordance with

ASTM A792/A792M, Class AZ50 coating designation, Grade 40; prepainted by coil-coating process to comply with ASTM A755/A755M.

1. Surface: [Smooth, flat] [Embossed] [and mill phosphatized for field painting] [and with manufacturer's standard clear acrylic coating on both sides].
2. Exposed Coil-Coated Finish:
   a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   b. Color: Match existing exposed coping color.

2.2 Miscellaneous Materials and Accessories:

A. Fasteners: Same metal as flashing/sheet metal or other non-corrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.

B. Bituminous Coating: SSPC - Paint 12, solvent-type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.

C. Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealers."

D. Paper Slip Sheet: 5-lb. rosin-sized building paper.

F. Reglets: Metal units of type and profile indicated, compatible with flashing indicated, noncorrosive.

G. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gage required for performance.

2.3 FABRICATED UNITS

A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance, with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

B. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.

C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

D. Sealant Joints: Where movable, nonexpansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.

E. Separations: Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

2.4 COPINGS, SCUPPERS, DOWNSPOUTS AND CONDUCTOR HEADS

A. Copings: Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Shop fabricate interior and exterior corners.
1. Coping Profile: As shown to match existing profile and fascia exposure.
2. Joint Style: Butted with expansion space and 6-inch-wide, concealed backup plate.
3. Fabricate from the following materials:
i. Metallic-Coated Steel Sheet: 0.040 inch (20 ga.) thick.

B. Downspouts: Fabricate rectangular, smooth downspouts, SMACNA 1-32B, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors.

1. Metallic-Coated Steel Sheet, 0.040 inch (20 ga.) thick.
2. Downspout hanger design: SMACNA 1-35G.
3. Splash blocks: Provide one 12” x 24” x 3” thick concrete splash block at the base of each downspout.

C. Parapet Scuppers: Fabricate scuppers of dimensions shown on the drawings with closure flange trim to the exterior, 4” wide wall flanges to the interior and base extending 4” beyond cant or tapered strip into field of roof.

1. Material: Stainless steel 26 ga.
2. Standard: Comply with SMACNA figure 1-26

D. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape indicated on the drawings with outlet tubes and exterior flange trim.

1. Metallic-Coated Steel Sheet, 0.027 inch (24 ga.) thick.
3. Standard: Comply with SMACNA figure 1-25F

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations and with SMACNA "Architectural Sheet Metal Manual." Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.

B. Copings: Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated.

1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 16-inch centers.
2. Anchor interior leg of coping with gasketed screw fasteners through slotted holes at 24-inch centers.

D. Parapet Scuppers:

1. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, and under roofing membrane.
2. Solder exterior wall scupper flanges into back of conductor head.

D. Downspouts:

1. Join sections with 1-1/2-inch telescoping joints.
2. Provide hangers with fasteners designed to hold downspouts securely to walls.
3. Locate hangers at top and bottom and at approximately 60 inches o.c.
4. Provide mitered elbows at base of downspout to direct water away from building.

G. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 1 inch below scupper discharge.

D. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

3.2 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

B. Protection: Contractor shall protect flashings and sheet metal work during construction to ensure that work will be without damage or deterioration other than natural weathering at time of Substantial Completion.

END OF SECTION 076200

SECTION 099000 – PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

. This Section includes surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this section are in addition to shop priming and surface treatment specified under other sections.

A. Paint exposed surfaces whether or not colors are designated in "schedule," except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color of finish is not designated, the Architect will select from standard colors or finishes available.

1. Painting includes field painting exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.

B. Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, and labels unless otherwise indicated on the drawings.

1. Prefinished items not to be painted include the following factory-finished components:

a. Acoustic materials.
b. Architectural woodwork and casework.
c. Elevator entrance doors and frames.
d. Elevator equipment.
e. Finished mechanical and electrical equipment.
f. Light fixtures.
g. Switchgear.
h. Distribution cabinets.

2. Concealed surfaces not to be painted include wall or ceiling surfaces in the following generally inaccessible areas:

a. Foundation spaces.
b. Furred areas.
c. Utility tunnels.
d. Pipe spaces.
e. duct shafts.
f. Elevator shafts.

3. Finished metal surfaces not to be painted include:

a. Pre-finished storefront work.
b. Anodized aluminum.

c. Stainless steel.
d. Chromium plate.
e. Copper.
f. Bronze.
g. Brass.

4. Operating parts not to be painted include moving parts of operating equipment such as the following:

1. Valve and damper operators.
2. Linkages.
3. Sensing devices.
4. Motor and fan shafts.

5. Labels: Do not paint over Underwriter's Laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Related Sections: The following sections contain requirements that relate to this section:

1. Division 1 Section - "Cutting and Patching"

1.3 DEFINITIONS

A. "Paint" includes coating systems materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate, or finish coats.

1.4 SUBMITTALS

A. Products Data: Manufacturer's technical information, label analysis, material safety & data sheets highlighting VOC limits and application instructions for each material proposed for use.

1. List each material and cross-reference the specific coating and finish system and application. Identify each material by the manufacturer's catalog number and general classification.

B. Samples for initial color selection in the form of manufacturer's color charts.

1. After color selection, the Architect will furnish color chips for surfaces to be coated.

C. Samples for Verification Purposes: Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate. Define each separate coat, including block fillers and primers. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture are achieved.

1. Provide a list of material and application for each coat of each sample. Label each sample as to location and application.

2. Submit samples on the following substrates for the Architect's review of color and texture only:

a. Concrete: Provide two 4-inch-square samples for each color and finish.
b. Concrete Masonry: Provide two 4- by 8-inch samples of masonry, with mortar joint in the centers, for each finish and color.
c. Painted Wood: Provide two 12- by 12-inch samples of each color and material

on hardboard.

d. Stained or Natural Wood: Provide two 4- by 8-inch samples of natural and stained wood finish on actual wood surfaces.
e. Ferrous Metal: Provide two 4-inch-square samples of flat metal and two 8-inch-long samples of solid metal for each color and finish.
f. Aliphatic urethane over steel: Provide two (2) 4" square samples.

D. Certificates - Certification shall be made that the products comply with the environmental requirements set forth in Part 1.9 below.

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

B. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect of problems anticipated using the materials specified.

C. Field Samples: On wall surfaces and other exterior and interior components, duplicate finishes of prepared samples. Provide full-coat finish samples on at least 100 sq. fit. of surface until required sheen, color and texture are obtained; simulate finished lighting conditions for review of in-place work.

1. Final acceptance of colors will be from job-applied samples.
2. The Architect will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted. Apply coatings in this room or surface in accordance with the schedule or as specified. After finishes are accepted, this room or surface will be used for evaluation of coating systems of a similar nature.

D. Material Quality: Provide the manufacturer's best quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

1.6 PRODUCT HANDLING

A. Deliver materials to the site in original, new and unopened packages and containers bearing manufacturer's name and label.
B. Provide paint manufacturer's printed label on each container with the following information.

1. Name or title of material.
2. Manufacturer's stock number.
3. Manufacturer's name.
4. Analysis of major pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name or number.
8. Manufacturer's recommended wet and dry film thickness in mils.

1.7 COLOR SELECTION

A. Colors shall be selected by Arlington County representative.

B. Proprietary names of a specified manufacturer used to designate colors or materials are not intended to imply that products of the specified manufacturer are required to the exclusion of equivalent approved colors or materials of other manufacturers.

1.8 PAINT COORDINATION

A. Provide finish coats compatible with prime paints used. Review other sections of specifications in which prime coats are specified to ensure compatibility of the total coating system.

1.9 INDOOR AIR QUALITY

A. Paints and coatings shall meet the requirements set forth in section 01 74 20 Construction Indoor Air Quality.

B. Substitutions other than the listed manufacturer must be accompanied by a certificate from the substituted manufacturer stating that each of the paints submitted meets:

1. The requirements in part 1.9.A and:
2. The substituted manufacturer can provide the same range of colors as the listed manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer and use only within recommended limits.

B. Painting materials recommended are products of The Sherwin-Williams Company. Other acceptable manufacturers provided they meet the specification are:

1. Benjamin Moore
2. No manufacturer’s other than the two listed above may be used.

C. Water-based latex paints shall not contain mercury preservatives. Provide manufacturer's certification attesting that paint provided under this section does not contain mercury.

D. Oil-based paints shall not be applied on interior building surfaces, or other areas where exposure of occupants to fumes is a possibility.

E. All paints used on the project must comply with the VOC limits set forth in section 1.9 above.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which painting work will be performed. Notify Architect, in writing, of conditions detrimental to proper execution of the work. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Starting of painting work will be construed as acceptance of surfaces within particular area.

C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

3.2 SURFACE PREPARATION

A. General:

1. Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions for each substrate condition.
2. Remove hardware, hardware accessories, machine surfaces, plates, lighting fixtures and similar items in place and not to be finish painted or provide surface applied protection prior to surface preparation and painting operations. Following completion of painting of each space or area, reinstall removed items.
3. Clean surface to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program the cleaning and painting so that dust and other contaminants from the cleaning process will not settle on to wet, newly painted surfaces.
4. Dislodge dirt, mortar splatters, and other dry materials from surfaces by scraping and brushing. Remove loose material by brushing, sweeping, and vacuuming.

3.3 MATERIALS PREPARATION

A. Mix and prepare paint materials in accordance with manufacturer's directions. Stir materials before application to produce a mixture of uniform density and stir as required during the application of the materials. Do not stir surface film into the material. Remove the film and if necessary strain the material before using.

3.4 APPLICATION

A. General:

1. Apply paint by brush, roller, or spray in accordance with manufacturer's directions. Use brushes best suited for type of material being applied. Use roller of carpet, velvet back or high pile sheep’s wool as recommended by paint manufacturer for material and texture required. Spray paint uniformly with suitable equipment.

    a. Spray operations shall be confined to those times where the building is unoccupied.

2. Number of coats and paint film thickness required is same regardless of application method.
3. Apply additional coats when undercoats, stains, or other conditions show through the final coat of paint, until paint film is of uniform finish, color, and appearance.
4. "Exposed surfaces" shall mean areas visible when permanent or built-in fixtures, convector covers, grilles, etc., are in place in areas scheduled to be painted.
5. Paint interior surfaces of ducts, where visible through registers, grilles, decorative ceiling, with flat, non-specular black paint.

B. Minimum Coating Thickness:

1. Apply each material at not less than manufacturer's recommended spreading rate, to provide a total wet and dry film thickness of not less than that indicated on manufacturer's printed label.

C. Pigmented (Opaque) Finishes:

1. Cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage.

D. Transparent (Clear) Finishes:

1. On exposed portions, use multiple coats to produce glass-smooth surface film continuity of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.
2. Provide satin finish for final coats, unless otherwise indicated.

E. Brush Application:

1. Brush-out and work brush coats onto surface in an even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

F. Mechanical Applications:

1. Limit roller applications to interior wall and ceiling finish coats. Apply each roller coat to provide equivalent hiding as brush-applied coats.
2. Confine spray application to metal framework, siding, decking, wire mesh and similar surfaces where hand brush work would be inferior.
3. Wherever spray application is used, apply each coat to provide the equivalent hiding of brush-applied coats. Do not double back with spray equipment for the purpose of building up film thickness of 2 coats in one pass.

    a. Do not use spray applications at acoustical concrete block units.

G. Complete Work:

1. Match samples for color, texture, and coverage. Remove finish or repaint work not in compliance with specified requirements.

3.5 PAINTING SCHEDULE, EXTERIOR

A. Concrete, Stucco, Mineral-fiber Reinforced Cement Panels and Restored Masonry - walls:

1. Satin Finish (10 – 20 Units @ 85°):

a. 1st Coat: S-W Loxon Conditioner Guide Coat White A24W100	106 g/l VOC
b. 2nd Coat: S-W 100 % Acrylic B12WF Series	96 g/l VOC
c. 3rd Coat: S-W 100 % Acrylic B12WF Series	96 g/l VOC

B. Concrete Masonry Units:

1. Satin Finish (10 – 20 units @ 85°):

a. 1st Coat: S-W PrepRite Block Filler B25W25	42 g/l VOC
b. 2nd Coat: S-W 100 % Acrylic B12WF Series	96 g/l VOC
c. 3rd Coat: S-W 100 % Acrylic B12WF Series	96 g/l VOC

3.6 CLEANING

A. Touch-up and restore where finish is damaged.

B. Remove spilled, splashed, or splattered paint from all surfaces

C. Remove all debris, painting accessories, paint cans, and other associated equipment from the premises and legally dispose of off-site. Do not leave surplus opened painting materials on the premises as "attic stock".

D. Attic stock – Provide 2 unopened gallons of each color and type of paint used. Top of cans shall be clearly labeled with color name and number and a color card.

3.9 WASTE MANAGEMENT

A. Separate waste in accordance with the approved waste management plan. Set aside extra paint for future color matches, or reuse by owner, school theatre sets, Habitat for Humanity, etc. Where local options exist for left over paint recycling, collect all waste paint by type and provide for delivery to recycling or collection facility.

B. Close and seal tightly all partly used paint and finish containers and store protected in well ventilated, fire safe area at moderate temperature.

C. Place empty containers of solvent based paints in areas designated for hazardous materials.

D. Do not dispose of paints or solvents by pouring on the ground. Place in designated containers for proper disposal.

PART 4 – MEASUREMENT AND PAYMENT

A. Payment will be made on the basis of the lump sum bid prices and shall constitute full compensation for all materials, equipment, labor, and incidentals necessary to complete the work of this Section as drawn and specified.

END OF SECTION 099000

SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Dielectric fittings.
3. Mechanical sleeve seals.
4. Sleeves.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than plumbing and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and plumbing equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.3 SUBMITTALS

A. Welding certificates.

1.4 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.

C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.

F. Welding Filler Metals: Comply with AWS D10.12.

G. Solvent Cements for Joining Plastic Piping:

1. ABS Piping: ASTM D 2235.
2. CPVC Piping: ASTM F 493.
3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
4. PVC to ABS Piping Transition: ASTM D 3138.

2.3 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

2.4 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

B. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

C. Pressure Plates: Carbon steel. Include two for each sealing element.

D. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.5 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.

F. PVC Pipe: ASTM D 1785, Schedule 40.

G. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump

sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors.

M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches (150 mm) in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches (150 mm) and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

O. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.

Q. Verify final equipment locations for roughing-in.

R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
5. PVC Nonpressure Piping: Join according to ASTM D 2855.
6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End Pipe and Fittings: Use butt fusion.
2. Plain-End Pipe and Socket Fittings: Use socket fusion.

M. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.3 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

END OF SECTION 220500

SECTION 220523 – CURB VALVES AND METER BOXES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Curb valves.

2. Water Meter Boxes

B. Related Sections:

1. Division 22 plumbing piping Sections for specialty valves applicable to those Sections only.
2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.
3. Division 33 water distribution piping Sections for general-duty and specialty valves for site construction piping.

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

A. ASME Compliance: ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.

B. NSF Compliance: NSF 61 for valve materials for potable-water service.

PART 2 - PRODUCTS

2.1 CURB VALVES

A. Service-Saddle Assemblies: Comply with AWWA C800. Include saddle and valve compatible with tapping machine.

1. Service Saddle: Copper alloy with seal and AWWA C800, threaded outlet for corporation valve.
2. Corporation Valve: Bronze body and ground-key plug, with AWWA C800, threaded inlet and outlet matching service piping material.
3. Manifold: Copper fitting with two to four inlets as required, with ends matching corporation valves and outlet matching service piping material.

B. Curb Valves: Comply with AWWA C800. Include bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.

C. Service Boxes for Curb Valves: Similar to AWWA M44 requirements for cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over curb valve and with a barrel approximately 3 inches (75 mm) in diameter.

1. Shutoff Rods: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.

2.2 WATER METER BOXES

A. Description: Cast-iron body and cover for disc-type water meter, with lettering "WATER METER" in cover; and with slotted, open-bottom base section of length to fit over service piping.

1. Option: Base section may be cast-iron, PVC, clay, or other material pipe.

B. Description: Cast-iron body and double cover for disc-type water meter, with lettering "WATER METER" in top cover; and with separate inner cover; air space between covers; and slotted, open-bottom base section of length to fit over service piping.

C. Description: Polymer-concrete body and cover for disc-type water meter, with lettering "WATER" in cover; and with slotted, open-bottom base section of length to fit over service piping. Include vertical and lateral design loadings of 15,000 lb. minimum over 10 by 10 inches (6800 kg minimum over 254 by 254 mm) square.

2.3 VALVE INSTALLATION

A. Install valves with unions at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install swing check valves for proper direction of flow and in horizontal position with hinge pin level.

2.4 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

2.5 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, butterfly, or gate valves.
2. Throttling Service: ball, or butterfly valves.

a. NPS 2 (DN 50) and Smaller: Bronze swing check valves with bronze or nonmetallic disc.

B. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine mating flange faces for damage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

D. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install valve tags. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

If using the same valve for both low- and high-pressure applications, consider deleting "Low-Pressure, Compressed-Air Valve Schedule (150 psig (1035 kPa) or less" or "High-Pressure, Compressed-Air Valve Schedule (150 to 200 psig (1035 to 1380 kPa)" Article below and modifying the remaining article title by removing reference to low or high pressure.

END OF SECTION 220523

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SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Below ground domestic water pipes, tubes, fittings, and specialties.

1.3 SUBMITTALS

A. Product Data: For the following products:

1. Specialty valves.
2. Transition fittings.
3. Dielectric fittings.

B. Water Samples: Specified in "Cleaning" Article.

C. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 61 for potable domestic water piping and components.

1.5 PROJECT CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of water service.
2. Do not proceed with interruption of water service without Owner's written permission.

1.6 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM Type K (ASTM B88M, Type A) water tube, drawn temper.

1. Cast-Copper Solder-Joint Fittings: ASME B16.18, pressure fittings.
2. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
3. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
4. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

2.3 PIPING JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

B. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.4 SPECIALTY VALVES

A. Comply with requirements in Division 15 Section "General-Duty Valves for Plumbing Piping" for general-duty metal valves.

B. Comply with requirements in Division 15 Section "Domestic Water Piping Specialties" for balancing valves, drain valves, backflow preventers, and vacuum breakers.

2.5 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.

B. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Capitol Manufacturing Company.
    b. Central Plastics Company.
    c. EPCO Sales, Inc.
    d. Hart Industries International, Inc.
    e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
    f. Zurn Plumbing Products Group; Wilkins Water Control Products.

2. Description:

a. Pressure Rating: 150 psig (1035 kPa) at 180 deg F (82 deg C).
b. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Capitol Manufacturing Company.
b. Central Plastics Company.
c. EPCO Sales, Inc.
d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Factory-fabricated, bolted, companion-flange assembly.
b. Pressure Rating: 150 psig (1035 kPa).
c. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Kits:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Central Plastics Company.
d. Pipeline Seal and Insulator, Inc.

2. Description:

a. Nonconducting materials for field assembly of companion flanges.
b. Pressure Rating: 150 psig (1035 kPa).
c. Gasket: Neoprene or phenolic.
d. Bolt Sleeves: Phenolic or polyethylene.
e. Washers: Phenolic with steel backing washers.

E. Dielectric Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Calpico, Inc.
b. Lochinvar Corporation.

2. Description:

a. Galvanized-steel coupling.
b. Pressure Rating: 300 psig (2070 kPa) at 225 deg F (107 deg C).
c. End Connections: Female threaded.

d. Lining: Inert and noncorrosive, thermoplastic.

F. Dielectric Nipples:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Perfection Corporation; a subsidiary of American Meter Company.
b. Precision Plumbing Products, Inc.
c. Victaulic Company.

2. Description:

a. Electroplated steel nipple complying with ASTM F 1545.
b. Pressure Rating: 150 psig (1035 kPa).
c. End Connections: Male threaded or grooved.
d. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install shutoff valve immediately upstream of each dielectric fitting.

C. Install domestic water piping with 0.25 percent slope downward toward drain and plumb.

D. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and coordinate with other services occupying that space.

G. Install piping adjacent to equipment and specialties to allow service and maintenance.

H. Install piping to permit valve servicing.

I. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.

J. Install piping free of sags and bends.

K. Install fittings for changes in direction and branch connections.

L. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

M. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

N. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

O. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

P. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.

Q. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

R. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.2 VALVE INSTALLATION

A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations.

B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 2 (DN 50) and smaller. Use butterfly or gate valves for piping NPS 2-1/2 (DN 65) and larger.

C. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping. Drain valves are specified in Division 15 Section "Domestic Water Piping Specialties."

1. Hose-End Drain Valves: At low points in water mains, risers, and branches.
2. Stop-and-Waste Drain Valves: Instead of hose-end drain valves where indicated.

D. Install balancing valve in each hot-water circulation return branch and discharge side of each pump and circulator. Set balancing valves partly open to restrict but not stop flow. Use ball valves for piping NPS 2 (DN 50) and smaller and butterfly valves for piping NPS 2-1/2 (DN 65) and larger. Comply with requirements in Division 15 Section "Domestic Water Piping Specialties" for balancing valves.

3.3 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

3.4 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 (DN 50) and Smaller: Use dielectric couplings.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Use dielectric flanges.

D. Dielectric Fittings for NPS 5 (DN 125) and Larger: Use dielectric flange kits.

3.5 FLEXIBLE CONNECTOR INSTALLATION

A. Install flexible connectors in suction and discharge piping connections to each domestic water pump.

B. Install bronze-hose flexible connectors in copper domestic water tubing.

3.6 COORDINATION

A. Coordinate piping installations and specialty arrangements with schematics on Drawings and with requirements specified. If Drawings are explicit enough, these requirements may be reduced or omitted.

B. Drawings indicate general arrangement of piping, fittings, and specialties.

C. Install piping adjacent to equipment and machines to allow service and maintenance.

D. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

E. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
   1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.

3.7 IDENTIFICATION

A. Identify system components. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for identification materials and installation.

B. Label pressure piping with system operating pressure.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Piping Inspections:

   1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.

2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

    a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
    b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

C. Piping Tests:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
4. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
6. Prepare reports for tests and for corrective action required.

D. Domestic water piping will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.9 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

    a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.
    b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.10 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

3.11 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

3.12 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball or gate valves for piping NPS 2 (DN 50) and smaller. Use butterfly, ball, or gate valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
2. Throttling Duty: Use ball or globe valves for piping NPS 2 (DN 50) and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
3. Hot-Water Circulation Piping, Balancing Duty: Memory-stop balancing valves.
4. Drain Duty: Hose-end drain valves.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

END OF SECTION 221116

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following domestic water piping specialties:

1. Ground hydrants.

B. See Division 22 Section "Domestic Water Piping" for water meters.

1.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig (860 kPa), unless otherwise indicated.

1.3 SUBMITTALS

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

B. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 WALL HYDRANTS

A. Non-freeze Ground Hydrants:

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

a. Josam Company.
b. MIFAB, Inc.
c. Prier Products, Inc.
d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
e. Tyler Pipe; Wade Div.
f. Watts Drainage Products Inc.
g. Woodford Manufacturing Company.
h. Zurn Plumbing Products Group; Light Commercial Operation.
i. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.21.3M for concealed-outlet, self-draining ground hydrants.
3. Pressure Rating: 125 psig (860 kPa).
4. Operation: Loose key.
5. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.

6. Inlet: NPS 3/4 (DN 20).
7. Outlet: Concealed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
8. Box: Deep, flush mounting with cover.
9. Box and Cover Finish: chrome plated.
10. Outlet: Exposed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
11. Nozzle and Ground-Plate Finish: chrome plated.
12. Operating Keys(s): Two with each ground hydrant.
13. Basis of Design: Zurn Model Z1361-CL-VB

2.2 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.

B. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.

2.3 FIELD QUALITY CONTROL

A. Perform the following tests and prepare test reports:

B. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPING SPECIALTIES

A. Ground Hydrants: Install with 1 cu. yd. (0.75 cu. m) of crushed gravel around drain hole. Set ground hydrants with box flush with grade.

3.2 PIPING CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping specialties adjacent to equipment and machines, allow space for service and maintenance.

C. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

D. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

E. Perform the following tests and inspections.
1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

F. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

G. Prepare test and inspection reports.

END OF SECTION 221119

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SECTION 26 04 21 - UTILITY SERVICE ENTRANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to this Section.

1.2 SECTION INCLUDES

A. Arrangement with Utility Company for permanent electric service, including payment of Utility Company charges for service.

B. Underground service entrance.

C. Metering equipment.

1.3 RELATED SECTIONS

A. Section 31 20 00 – Earth Moving.

B. Section 26 05 26 – Grounding and Bonding for Electrical Systems.

1.4 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

1.5 SYSTEM DESCRIPTION

A. Utility Company: Dominion Virginia Power.

B. System Characteristics: 208/120 volts, three phase, 4 wire, 60 Hertz.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with Utility Company written requirements.

PART 2 - PRODUCTS

2.1 UTILITY METERS

A. Meters will be furnished by Utility Company.

2.2 UTILITY METER CABINET

A. Cabinet shall be provided by contractor with provision for installation of utility company equipment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify conditions under provisions of Division 01.

B. Verify that service equipment is ready to be connected and energized.

3.2 PREPARATION

A. Make arrangements with Utility Company to obtain permanent electric service to the Project.

B. Coordinate location of Utility Company's facilities to ensure proper access is available.

3.3 INSTALLATION

A. Install primary conduit and secondary ductbank as indicated on contract drawings.

END OF SECTION 260421

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

B. NBR: Acrylonitrile-butadiene rubber.

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Field quality-control test reports.

1.6 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 NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

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. Alcan Products Corporation; Alcan Cable Division.
2. American Insulated Wire Corp.; a Leviton Company.
3. General Cable Corporation.
4. Senator Wire & Cable Company.
5. Southwire Company.

B. Copper Conductors: Comply with NEMA WC 70.

C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN and XHHW.

D. Multiconductor Cable: Comply with NEMA WC 70 for metal-clad cable, Type MC; mineral-insulated, metal-sheathed cable, Type MI with ground wire.

2.2 CONNECTORS AND SPLICES

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. AFC Cable Systems, Inc.
2. Hubbell Power Systems, Inc.
3. O-Z/Gedney; EGS Electrical Group LLC.
4. 3M; Electrical Products Division.
5. Tyco Electronics Corp.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN-THWN, single conductors in raceway or Type XHHW, single conductors in raceway.

B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-THWN, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.

E. Exposed Branch Circuits: Type THHN-THWN, single conductors in raceway; Metal-clad cable, Type MC (can be used for final connections to lighting fixture outlets – maximum 6 feet in length).

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway; Metal-clad cable, Type MC (can be used for final connections to lighting fixture outlets – maximum 6 feet in length).

G. Class 1 Control Circuits: Type THHN-THWN, in raceway.

H. Class 2 Control Circuits: Type THHN-THWN, in raceway; Power-limited cable, concealed in building finishes.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables according to Section 26 05 29 "Hangers and Supports for Electrical Systems."

F. Identify and color-code conductors and cables according to Section 26 0553 "Identification for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 07 84 13 "Firestopping."

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.

    a. Communications and Alarm/ Security monitoring supply circuit.

    b. HVAC and mechanical load circuits.

2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.

    a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
    b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
    c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

C. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 26 05 19

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Grounding systems and equipment.

B. Section includes grounding systems and equipment, plus the following special applications:
   1. Underground distribution grounding.

1.3 INFORMATIONAL SUBMITTALS

A. Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
   1. Ground rods.
   2. Ground rings.
   3. Grounding for sensitive electronic equipment.

B. Qualification Data: For qualified testing agency and testing agency's field supervisor.

C. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

   1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

2.2 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.

1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless exothermic-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet (19 mm by 3 m) in diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.

1. Bury at least 24 inches (600 mm) below grade.
2. Duct-Bank Grounding Conductor: Bury 12 inches (300 mm) above duct bank when indicated as part of duct-bank installation.

C. Grounding Bus: Install in electrical room and elsewhere as indicated.

1. Install bus on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.

D. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches (150 mm) from the foundation.

3.3 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.
7. Metal-clad cable runs.
8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.

B. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.

1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4-by-12-inch (6.3-by-100-by-300-mm) grounding bus.
3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

C. Metal Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.4 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

D. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.

E. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

F. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.

3.5 LABELING

A. Comply with requirements in Section 26 0553 "Identification for Electrical Systems" for instruction signs. The label or its text shall be green.

B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.

1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before any conductors are connected.

    a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.

4. Prepare dimensioned Drawings locating each ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

E. Grounding system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

G. Report measured ground resistances that exceed the following values:
1. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
2. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).

H. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26

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SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Metal wireways and auxiliary gutters.
3. Surface raceways.
4. Boxes, enclosures, and cabinets.

B. Related Requirements:

1. Section 099100 – Painting: for painting all expose-to-view items in public areas.

1.3 DEFINITIONS

A. GRC: Galvanized rigid steel conduit.

B. IMC: Intermediate metal conduit.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer.

B. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

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

1. AFC Cable Systems, Inc.
2. Allied Tube & Conduit; a Tyco International Ltd. Co.
3. Anamet Electrical, Inc.
4. Electri-Flex Company.
5. O-Z/Gedney; a brand of EGS Electrical Group.
6. Picoma Industries, a subsidiary of Mueller Water Products, Inc.

7. Republic Conduit.
8. Robroy Industries.
9. Southwire Company.
10. Thomas & Betts Corporation.
11. Western Tube and Conduit Corporation.
12. Wheatland Tube Company; a division of John Maneely Company.

B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. IMC: Comply with ANSI C80.6 and UL 1242.

E. EMT: Comply with ANSI C80.3 and UL 797.

F. FMC: Comply with UL 1; zinc-coated steel or aluminum.

G. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

H. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
1. Fittings for EMT:
   a. Material: Steel or die cast.
   b. Type: Setscrew or compression.
2. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.

I. Joint Compound for IMC or GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 METAL WIREWAYS AND AUXILIARY GUTTERS

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

1. Cooper B-Line, Inc.
2. Hoffman; a Pentair company.
3. Mono-Systems, Inc.
4. Square D; a brand of Schneider Electric.

B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.

C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Screw-cover type unless otherwise indicated.

E. Finish: Manufacturer's standard enamel finish.

2.3 BOXES, ENCLOSURES, AND CABINETS

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

1. Adalet.
2. Cooper Technologies Company; Cooper Crouse-Hinds.
3. EGS/Appleton Electric.
4. Erickson Electrical Equipment Company.
5. FSR Inc.
6. Hoffman; a Pentair company.
7. Hubbell Incorporated; Killark Division.
8. Kraloy.
9. Milbank Manufacturing Co.
10. Mono-Systems, Inc.
11. O-Z/Gedney; a brand of EGS Electrical Group.
12. RACO; a Hubbell Company.
13. Robroy Industries.
14. Spring City Electrical Manufacturing Company.
15. Stahlin Non-Metallic Enclosures; a division of Robroy Industries.
16. Thomas & Betts Corporation.
17. Wiremold / Legrand.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.

G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

H. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

I. Gangable boxes are allowed.

J. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

K. Cabinets:

1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC.
2. Concealed Conduit, Aboveground: GRC.
3. Underground Conduit: Type EPC-40-PVC, Type EPC-80-PVC unless otherwise noted in contract documents.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC, GRC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: GRC, IMC. Raceway locations include the following:

    a. Loading dock.
    b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    c. Mechanical rooms.

4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: GRC.
7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250.

C. Minimum Raceway Size: 3/4-inch (21-mm) trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Section 26 0529 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inches (300 mm) of enclosures to which attached.

I. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot (3-m) intervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 1 inch (25 mm) of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change to GRC before rising above floor.

J. Stub-ups to Above Recessed Ceilings:

1. Use EMT or IMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

L. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

M. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

N. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

O. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

P. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

Q. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

R. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

S. Surface Raceways:

1. Install surface raceway with a minimum 2-inch (50-mm)radius control at bend points.
2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

T. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

U. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

V. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

W. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

X. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

Y. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

Z. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

AA. Locate boxes so that cover or plate will not span different building finishes.

BB. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

CC. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

DD. Set metal floor boxes level and flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 31 2000 "Earth Moving" for pipe less than 6 inches (150 mm) in nominal diameter.
2. Install backfill as specified in Section 31 2000 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 31 2000 "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete for a minimum of 12 inches (300 mm) on each side of the coupling.
    b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

6. Warning Planks: Bury warning planks approximately 12 inches (300 mm) above direct-buried conduits but a minimum of 6 inches (150 mm) below grade. Align planks along centerline of conduit.
7. Underground Warning Tape: Comply with requirements in Section 26 0553 "Identification for Electrical Systems."

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 0544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.5 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 07 8400 "Firestopping."

3.6 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

B. Related Requirements:

1. Section 07 84 00 "Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

F. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Advance Products & Systems, Inc.
b. CALPICO, Inc.
c. Metraflex Company (The).
d. Pipeline Seal and Insulator, Inc.
e. Proco Products, Inc.

2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Plastic.
4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Presealed Systems.

2.4 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

   a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 07 9200 "Joint Sealants."
   b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level. Install sleeves during erection of floors.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 260544

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

1.3 ACTION SUBMITTALS

A. Product Data: For each electrical identification product indicated.

B. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Colors for Raceways Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking cable tie fastener.

G. Write-On Tags: Polyester tag, 0.010 inch (0.25 mm) or 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Colors for Raceways Carrying Circuits at 600 V and Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches (50 mm) wide; compounded for outdoor use.

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking cable tie fastener.

D. Write-On Tags: Polyester tag, 0.010 inch (0.25 mm) or 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
   1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

E. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

2.4 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

F. Write-On Tags: Polyester tag, 0.010 inch (0.25 mm) or 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
   1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.5 FLOOR MARKING TAPE

A. 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.6 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.

C. Tag: Type I:

1. Pigmented polyolefin, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
2. Thickness: 4 mils (0.1 mm).
3. Weight: 18.5 lb/1000 sq. ft. (9.0 kg/100 sq. m).
4. 3-Inch (75-mm) Tensile According to ASTM D 882: 30 lbf (133.4 N), and 2500 psi (17.2 MPa).

2.7 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal size, 7 by 10 inches (180 by 250 mm).

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal size, 10 by 14 inches (250 by 360 mm).

E. Warning label and sign shall include, but are not limited to, the following legends:
   1. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.8 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.

   1. Engraved legend with black letters on white face.
   2. Punched or drilled for mechanical fasteners.
   3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).

2.9 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).

B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

C. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

D. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch (25 mm).

2.10 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.

   1. Minimum Width: 3/16 inch (5 mm).
   2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
   3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
   4. Color: Black except where used for color-coding.

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, Type 6/6 nylon.

   1. Minimum Width: 3/16 inch (5 mm).
   2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
   3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
   4. Color: Black.

C. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.

   1. Minimum Width: 3/16 inch (5 mm).

2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 7000 psi (48.2 MPa).
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
5. Color: Black.

2.11 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

G. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

H. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400 mm) overall.

J. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Identify with self-adhesive vinyl label. Install labels at 30-foot (10-m) maximum intervals.

B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:

1. Emergency Power.
2. Power.

C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
b. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.

c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

E. Conductors to Be Extended in the Future: Attach write-on tags or marker tape to conductors and list source.

F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

G. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.

1. Limit use of underground-line warning tape to direct-buried cables.
2. Install underground-line warning tape for both direct-buried cables and cables in raceway.

H. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.
4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
    a. Controls with external control power connections.

J. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

K. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:
    a. Indoor Equipment: Adhesive film label self-adhesive, engraved, laminated acrylic or melamine label or engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
    b. Outdoor Equipment: Engraved, laminated acrylic or melamine label, stenciled legend 4 inches (100 mm) high.
    c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
    d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:
    a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved, laminated acrylic or melamine label.
    b. Enclosures and electrical cabinets.
    c. Access doors and panels for concealed electrical items.
    d. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
    e. Enclosed switches.
    f. Enclosed circuit breakers.
    g. Enclosed controllers.
    h. Contactors.
    i. Remote-controlled switches, dimmer modules, and control devices.
    j. Battery-inverter units.
    k. Power-generating units.

l. Monitoring and control equipment.

END OF SECTION 26 05 53

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SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Lighting and appliance branch-circuit panelboards.

1.3 DEFINITIONS

A. TVSS: Transient voltage surge suppressor.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

   1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
   2. Detail enclosure types and details for types other than NEMA 250, Type 1.
   3. Detail bus configuration, current, and voltage ratings.
   4. Short-circuit current rating of panelboards and overcurrent protective devices.
   5. Include evidence of NRTL listing for series rating of installed devices.
   6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
   7. Include wiring diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Field Quality-Control Reports:

   1. Test procedures used.
   2. Test results that comply with requirements.
   3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

C. Panelboard Schedules: For installation in panelboards.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

B. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. Comply with NEMA PB 1.

F. Comply with NFPA 70.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

B. Handle and prepare panelboards for installation according to NECA 407.

1.9 PROJECT CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

B. Service Conditions: Usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet (2000 m).

C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of electric service.
2. Do not proceed with interruption of electric service without Owner's written permission.
3. Comply with NFPA 70E.

1.10 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

C. Coordinate final equipment short circuit rating with approved overcurrent protective device study prior to placing final order of equipment. All equipment / overcurrent protective devices shall be properly rated to handle the calculated available short-circuit current at the input terminals.

1.11 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Enclosures: Surface-mounted cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1.

2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
4. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
5. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
6. Finishes:

a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
b. Back Boxes: Galvanized steel.

7. Directory Card: Inside panelboard door, mounted in metal frame with transparent protective cover.

B. Incoming Mains Location: Top and bottom.

C. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
3. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box.
4. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and UL listed as suitable for nonlinear loads.
5. Split Bus: Vertical buses divided into individual vertical sections.

D. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Main and Neutral Lugs: Mechanical type.
3. Ground Lugs and Bus-Configured Terminators: Mechanical type.
4. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
5. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
6. Gutter-Tap Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
7. Extra-Capacity Neutral Lugs: Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.

E. Service Equipment Label: NRTL labeled for use as service equipment for panelboards or load centers with one or more main service disconnecting and overcurrent protective devices.

F. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

G. Panelboard Short Circuit Current Rating: Fully rated to 65,000 AIC interrupt symmetrical short-circuit current as indicated below or greater as is available at terminals.
1. Full-rated for connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include size and type of allowable upstream and branch devices, listed and labeled for series-connected short-circuit rating by an NRTL.
a. Provide minimum KALC fault current interrupt based on the study for all panels, panelboards and other applicable gear provided for this project.
b. Bidding: The Contractor shall bid the following: KALC fault current interrupt ratings. Provide credit to Owner where rating is reduced.
1) 208/120V Distribution Boards: 65,000 KALC.
2) 208/120V Panelboards: 42,000 KALC.

2.2 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: Circuit breaker or lugs only.

D. Branch Overcurrent Protective Devices: Plug-in circuit breakers, replaceable without disturbing adjacent units.

E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

F. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with series-connected rating or interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:

    a. Instantaneous trip.
    b. Long- and short-time pickup levels.
    c. Long- and short-time time adjustments.
    d. Ground-fault pickup level, time delay, and I^2t response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).

6. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
7. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.
    b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
    c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
    d. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
    e. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
    f. Multipole units enclosed in a single housing or factory assembled to operate as a single unit.
    g. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
    h. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

2.4 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

B. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Equipment Mounting: Install distribution panelboards on concrete bases, 4-inch (100-mm) nominal thickness. Comply with requirements for concrete base specified in Section 03 3000 "Cast-in-Place Concrete."

1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around full perimeter of base.
2. For distribution panelboards, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to panelboards.
5. Attach panelboard to the vertical finished or structural surface behind the panelboard.
6. Coordinate and provide steel support channel assemblies for panelboards and enclosures as required for structural coordination and / or to provide proper equipment clearance.

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.

D. Mount lighting and appliance branch-circuit panelboard top of trim 90 inches (2286 mm) above finished floor unless otherwise indicated.

E. Mount lighting and appliance branch-circuit panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

F. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.

G. Install filler plates in unused spaces.

H. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

I. Comply with NECA 1.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 26 0553 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 26 0553 "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 26 0553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

D. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:

a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
c. Instruments and Equipment:

1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

E. Panelboards will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as indicated

C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.

1. Measure as directed during period of normal system loading.
2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.6 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 262416

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SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Stripping and stockpiling rock.
   2. Removing above- and below-grade site improvements.
   3. Disconnecting, capping or sealing, removing site utilities and abandoning site utilities in place.
   4. Temporary erosion and sedimentation control.

B. Related Sections:

   1. Section 312000 – Earth Moving.

1.3 DEFINITIONS

A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 MATERIAL OWNERSHIP

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

1.6 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

   1. Use sufficiently detailed photographs or video recordings.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.7 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.

B. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises.

C. Utility Locator Service: Engage private utility locating service before site clearing.

D. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.

PART 2 - PRODUCTS

2.1. MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. 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.

B. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

C. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

D. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

E. No disturbed area, including stockpiles, is to remain denuded longer than 30 days without temporary seeding or otherwise stabilizing the area.

F. 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.

G. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 EXISTING UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.

1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.

1. The County will arrange with Utility company for disconnection of indicated utilities.
2. Owner will arrange to shut off indicated utilities when requested by Contractor.

C. Locate, identify, and disconnect utilities indicated to be abandoned in place.

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

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

E. Excavate for and remove underground utilities indicated to be removed.

3.4 CLEARING AND GRUBBING

A. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.

3.5 SITE IMPROVEMENTS

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

B. Remove slabs, paving, curbs, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.6 DISPOSAL OF SURPLUS AND WASTE MATERIALS

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

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

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for turf and grasses.
3. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Requirements:

1. Section 311000 - Site Clearing.
2. Section 329113 – Soil Preparation.
3. Section 329200 – Turf and Grasses.

1.3 UNIT PRICES

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

1.4 DEFINITIONS

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

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

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

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

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

E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

F. Fill: Soil materials used to raise existing grades.

G. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

H. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.5 INFORMATIONAL SUBMITTALS

A. Retain "Material Test Reports" Paragraph below for material test reports that are Contractor's responsibility.

B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D 2487.

2. Laboratory compaction curve according to ASTM D 698.

C. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

1.6 QUALITY ASSURANCE

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

1.7 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.

2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Utility Locator Service: Notify utility locating service before beginning earth-moving operations.

C. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified in Section 311000 – Site Clearing are in place.

D. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

E. Do not direct vehicle or equipment exhaust towards protection zones.

F. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

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

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or 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/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

G. Bedding Course: Crushed stone Virginia Department of Transportation (VDOT) size 57, 68, or 78 in accordance with VDOT Specification section 203 Table II-5.

2.2 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.

B. Protect and maintain erosion and sedimentation controls during earth-moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
   a. 24 inches outside of concrete forms other than at footings.
   b. 12 inches outside of concrete forms at footings.
   c. 6 inches outside of minimum required dimensions of concrete cast against grade.
   d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
   e. 6 inches beneath bottom of concrete slabs-on-grade.
   f. 6 inches beneath pipe in trenches and the greater of 24 inches wider than pipe or 42 inches wide.

3.5 EXCAVATION FOR PAVEMENTS

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

3.6 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.

3.7 SUBGRADE INSPECTION

A. If Geotechnical Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

B. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.8 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations.

3.9 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing trash and debris.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.10 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 voids with satisfactory soil while installing and removing shoring and bracing.
D. Place and compact final backfill of satisfactory soil to final subgrade elevation.
E. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.11 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.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.12 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.

3.13 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698 ASTM D 1557:

1. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.

3.14 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.

3.15 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.

3.16 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
2. Determine that fill material classification and maximum lift thickness comply with requirements.
3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.

B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.17 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

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

END OF SECTION 312000

SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Virginia Department of Transportation, Road and Bridge Specifications, 2020.

1.2 SUMMARY

A. Section Includes:

1. Cold milling of existing asphalt pavement.
2. Hot-mix asphalt paving.

B. Related Requirements:

1. Section 024116 - Structure Demolition.
2. Section 024119 - Selective Demolition.
3. Section 312000 - Earth Moving.
4. Section 321373 - Concrete Paving Joint Sealants.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include technical data and tested physical and performance properties.
2. Material certificates.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and testing agency.

B. Material Certificates: For each paving material.

C. Material Test Reports: For each paving material, by a qualified testing agency.

D. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Virginia Department of Transportation, Road and Bridge Specifications, 2020, Sections 106, 309 and 315.

B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Virginia Department of Transportation, Road and Bridge Specifications, 2020, Sections 106, 309 and 315.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Tack Coat: Minimum surface temperature of 60 deg F.

2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.

3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Coarse Aggregate: ASTM D 692/D 692M, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.

C. Fine Aggregate: ASTM D 1073 or AASHTO M 29, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.

2.2 ASPHALT MATERIALS

A. Asphalt Binder: AASHTO M 332, PG 64-22 in accordance with Virginia Department of Transportation, Road and Bridge Specifications, 2020, Section 210.

B. Tack Coat: ASTM D 977 or AASHTO M 140 emulsified asphalt, or ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application in accordance with Virginia Department of Transportation, Road and Bridge Standards, 2020, Section 210.

C. Water: Potable.

2.3 AUXILIARY MATERIALS

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

2.4 MIXES

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

1. Virginia Department of Transportation, Road and Bridge Specifications, 2020, Section 211.
2. Provide mixes with a history of satisfactory performance in geographical area where project is located.
3. Base Course: BM-25.0.
4. Surface Course: SM-12.5.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to begin paving.

B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction.
2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

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

3.2 PATCHING

A. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Tack Coat: Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of 0.05 to 0.15 gal./sq. yd.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

C. Placing Patch Material: Fill excavated pavement areas with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

3.3 SURFACE PREPARATION

A. Construction and placement including compaction and tolerances of hot-mix asphalt shall conform to the requirements of Virginia Department of Transportation, Road and Bridge Specifications, 2020, Section 315.

B. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

C. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.

D. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.4 PLACING HOT-MIX ASPHALT

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
2. Place hot-mix asphalt surface course in single lift.
3. Spread mix at a minimum temperature of 250 deg F.
4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Overlap mix placement about 1 to 1-1/2 inches from strip to strip to ensure proper compaction of mix along longitudinal joints.
2. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.5 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

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

3.6 COMPACTION

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

1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 96 percent of reference laboratory density according to ASTM D 6927 or AASHTO T 245, but not less than 94 percent or greater than 100 percent.
2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent or greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.7 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch.
2. Surface Course: Plus 1/4 inch, no minus.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch.
2. Surface Course: 1/8 inch.
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.

B. Replace and compact hot-mix asphalt where core tests were taken.

C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.9 WASTE HANDLING

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

END OF SECTION 321216

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Curbs and gutters.

B. Related Requirements:
1. Section 321373 - Concrete Paving Joint Sealants.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

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

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified ready-mix concrete manufacturer and testing agency.

B. Material Test Reports: For each of the following:

1. Aggregates.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

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

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 CONCRETE MATERIALS

A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C 150/C 150M, gray portland cement Type I.
2. Fly Ash: ASTM C 618, Class C or Class F].
3. Blended Hydraulic Cement: ASTM C 595/C 595M, Type IS, portland blast-furnace slag Type IP, portland-pozzolan cement.

B. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 4M, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C 260/C 260M.

D. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

E. Water: Potable and complying with ASTM C 94/C 94M.

2.3 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry or cotton mats.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

F. White, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B, dissipating.

2.4 RELATED MATERIALS

A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork in preformed strips.

B. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy-Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:

1. Types I and II, nonload bearing, Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Chemical Surface Retarder: Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch.

F. Rock Salt: Sodium chloride crystals, kiln dried, coarse gradation with 100 percent passing 3/8-inch sieve and 85 percent retained on a No. 8 sieve.

2.5 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that comply with or exceed requirements.

B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash or Pozzolan: 25 percent.
2. Slag Cement: 50 percent.
3. Combined Fly Ash or Pozzolan, and Slag Cement: 50 percent, with fly ash or pozzolan not exceeding 25 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 to 0.30 percent by weight of cement.

D. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use high-range, water-reducing and retarding admixture in concrete as required for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

E. Concrete Mixtures: Normal-weight concrete.

1. Compressive Strength (28 Days): 4500 psi.
2. Slump Limit: 4 inches plus or minus 1 inch.

2.6 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For concrete batches of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For concrete batches larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 312000 "Earth Moving."

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

3.2 PREPARATION

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

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Zinc-Coated Reinforcement: Use galvanized-steel wire ties to fasten zinc-coated reinforcement. Repair cut and damaged zinc coatings with zinc repair material.

F. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M.

G. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
2. Provide tie bars at sides of paving strips where indicated.
3. Butt Joints: Use bonding agent or epoxy-bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 50 feet unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows, to match jointing of existing adjacent concrete paving:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.
   a. Tolerance: Ensure that grooved joints are within 3 inches either way from centers of dowels.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
   a. Tolerance: Ensure that sawed joints are within 3 inches either way from centers of dowels.
3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement dowels and joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.

K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.

1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture-retaining-cover curing or a combination of these as follows:

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

3.9 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

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

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Testing Services: Testing and inspecting of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
   a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231/C 231M, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
    a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Owner, 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 Owner 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 Owner.

G. Concrete paving will be considered defective if it does not pass tests and inspections.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

I. Prepare test and inspection reports.

3.11 REPAIR AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Owner.

B. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants.
2. Hot-applied joint sealants.

B. Related Requirements:

1. Section 321216 - Asphalt Paving.
2. Section 321313 - Concrete Paving.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Paving-Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer or testing agency.

B. Product Certificates: For each type of joint sealant and accessory.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Product Testing: Test joint sealants using a qualified testing agency.

1.6 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.

3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

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

2.2 COLD-APPLIED JOINT SEALANTS

A. Single-Component, Self-Leveling, Silicone Joint Sealant: ASTM D 5893, Type SL.

2.3 HOT-APPLIED JOINT SEALANTS

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

2.4 JOINT-SEALANT BACKER MATERIALS

A. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

B. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.

2.5 PRIMERS

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience.

Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions.

C. Install joint-sealant backings to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint-sealant backings.
2. Do not stretch, twist, puncture, or tear joint-sealant backings.
3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:

1. Place joint sealants so they fully contact joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:

1. Remove excess joint sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING AND PROTECTION

A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.

B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

3.5 PAVING-JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Joints within concrete paving.

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

END OF SECTION 321373

SECTION 329113 - SOIL PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes planting soils specified by composition of the mixes.

B. Related Sections:
   1. Section 311000 - Site Clearing.
   2. Section 312000 - Earth Moving.
   3. Section 329200 - Turf and Grasses.

1.3 DEFINITIONS

A. AAPFCO: Association of American Plant Food Control Officials.

B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.

C. CEC: Cation exchange capacity.

D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.

E. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.

F. Imported Soil: Soil that is transported to Project site for use.

G. Layered Soil Assembly: A designed series of planting soils, layered on each other, that together produce an environment for plant growth.

H. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.

I. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.

J. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."

K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

L. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.

M. SSSA: Soil Science Society of America.

N. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

O. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

P. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.

Q. USCC: U.S. Composting Council.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include recommendations for application and use.
2. Include test data substantiating that products comply with requirements.
3. Include sieve analyses for aggregate materials.
4. Material Certificates: For each type of imported soil, soil amendment, and fertilizer before delivery to the site, according to the following:

    a. Manufacturer's qualified testing agency's certified analysis of standard products.
    b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.
    c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.

B. Samples: For each bulk-supplied material, 1-quart volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For each testing agency.

B. Preconstruction Test Reports: For preconstruction soil analyses specified in "Preconstruction Testing" Article.

C. Field quality-control reports.

1.7 QUALITY ASSURANCE

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

1.8 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction soil analyses on existing, on-site soil and imported soil.

B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.

1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.9 SOIL-SAMPLING REQUIREMENTS

A. General: Extract soil samples according to requirements in this article.

B. Sample Collection and Labeling: Have samples taken and labeled by Contractor under the direction of the testing agency.

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

1.10 TESTING REQUIREMENTS

A. General: Perform tests on soil samples according to requirements in this article.

B. Physical Testing:

1. Soil Texture: Soil-particle, size-distribution analysis by one of the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":

a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.

b. Hydrometer Method: Report percentages of sand, silt, and clay.

2. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
3. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
4. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85% compaction according to ASTM D 698 (Standard Proctor).

C. Chemical Testing:

1. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3-Chemical Methods."
2. Clay Mineralogy: Analysis and estimated percentage of expandable clay minerals using CEC by ammonium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 1- Physical and Mineralogical Methods."
3. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.
4. Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including aluminum, arsenic, barium, cadmium, chlorides, chromium, cobalt, copper, lead, lithium, mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc.

D. Fertility Testing: Soil-fertility analysis according to standard laboratory protocol of SSSA NAPT NEC-67, including the following:

1. Percentage of organic matter.
2. CEC, calcium percent of CEC, and magnesium percent of CEC.
3. Soil reaction (acidity/alkalinity pH value).
4. Buffered acidity or alkalinity.
5. Nitrogen ppm.
6. Phosphorous ppm.
7. Potassium ppm.
8. Manganese ppm.
9. Manganese-availability ppm.
10. Zinc ppm.
11. Zinc availability ppm.
12. Copper ppm.
13. Sodium ppm and sodium absorption ratio.
14. Soluble-salts ppm.
15. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
16. Other deleterious materials, including their characteristics and content of each.

E. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."

F. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.

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

1.11 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Do not move or handle materials when they are wet or frozen.
4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

PART 2 - PRODUCTS

2.1 PLANTING SOILS SPECIFIED BY COMPOSITION

A. General: Soil amendments, fertilizers, and rates of application specified in this article are guidelines that may need revision based on testing laboratory's recommendations after preconstruction soil analyses are performed.

B. Planting-Soil Type: Existing, on-site surface soil, with the duff layer, if any, retained and stockpiled on-site; modified to produce viable planting soil. Blend existing, on-site surface soil with the following soil amendments and fertilizers as noted in soil test results.

C. Planting-Soil Type: Imported, naturally formed soil from off-site sources and consisting of sandy loam, loam, or loamy sand soil according to USDA textures; and modified to produce viable planting soil.

1. Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches deep, not from agricultural land, bogs, or marshes; and that do not contain undesirable organisms; disease-causing plant pathogens; or obnoxious weeds and invasive plants including, but not limited to, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass.
2. Additional Properties of Imported Soil before Amending: Soil reaction of pH 6 to 7 and minimum of 4 percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration.
3. Unacceptable Properties: Clean soil of the following:

    a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.

b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 8 percent by dry weight of the imported soil.
c. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 2 inches in any dimension.

4. Amended Soil Composition: Blend imported, unamended soil with the soil amendments and fertilizers as noted in soil test results.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: T, with a minimum of 99 percent passing through a No. 8 sieve and a minimum of 75 percent passing through a No. 60 sieve.
2. Class: O, with a minimum of 95 percent passing through a No. 8 sieve and a minimum of 55 percent passing through a No. 60 sieve.
3. Form: Provide lime in form of ground dolomitic limestone.

B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Perlite: Horticultural perlite, soil amendment grade.

E. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.

F. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C 33/C 33M

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:

1. Feedstock: Limited to leaves
2. Reaction: pH of 5.5 to 8
3. Soluble-Salt Concentration: Less than 4dS/m.
4. Moisture Content: 35 to 55percent by weight.
5. Organic-Matter Content: minimum 30 percent of dry weight.
6. Particle Size: Minimum of 98 percent passing through a 1-inch sieve.

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture with 100 percent passing through a 1/2-inch sieve, a pH of 3.4 to 4.8, and a soluble-salt content measured by electrical conductivity of maximum 5 dS/m.

C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture with 100 percent passing through a 1/2-inch sieve, a pH of 6 to 7.5, a soluble-salt content

measured by electrical conductivity of maximum 5dS/m, having a water-absorbing capacity of 1100 to 2000 percent, and containing no sand.

D. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

2.4 FERTILIZERS

A. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20percent available phosphoric acid.

B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

C. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

D. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

PART 3 - EXECUTION

3.1 GENERAL

A. Place planting soil and fertilizers according to requirements in other Specification Sections.

B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.

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

3.2 PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

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

B. Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.

C. Unsuitable Materials: Clean soil to contain a maximum of 8 percent by dry weight of stones, roots, plants, sod, clay lumps, and pockets of coarse sand.

D. Screening: Pass unamended soil through a 2-inch sieve to remove large materials.

3.3 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Subgrade Preparation: Till subgrade to a minimum depth of 12 inches. Remove stones larger than 2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply, add soil amendments, and mix approximately half the thickness of unamended soil over prepared, loosened subgrade according to "Mixing" Paragraph below. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.

C. Mixing: Spread unamended soil to total depth of 6 inches, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.

1. Amendments: Apply soil amendments, except compost, and fertilizer, if required, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.

a. Mix lime and sulfur with dry soil before mixing fertilizer.
b. Mix fertilizer with planting soil no more than seven days before planting.

2. Lifts: Apply and mix unamended soil and amendments in lifts not exceeding 8 inches in loose depth for material compacted by compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

D. Compaction: Compact each blended lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698 and tested in-place.

E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 APPLYING COMPOST TO SURFACE OF PLANTING SOIL

A. Application: Apply 4 inches of compost to surface of in-place planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Finish Grading: Grade surface to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform the following tests and inspections:

1. Compaction: Test planting-soil compaction after placing each lift and at completion using a densitometer or soil-compaction meter calibrated to a reference test value based on laboratory testing according to ASTM D 698. Space tests at no less than one for each 2000 sq. ft. of in-place soil or part thereof.

C. Soil will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.

3.6 PROTECTION

A. Protection Zone: Identify protection zones according to Section 015639 "Temporary Tree and Plant Protection."

B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Vehicle traffic.
4. Foot traffic.
5. Erection of sheds or structures.
6. Impoundment of water.
7. Excavation or other digging unless otherwise indicated.

C. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Architect and replace contaminated planting soil with new planting soil.

3.7 CLEANING

A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.

B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.

1. Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.

END OF SECTION 329113

SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Seeding.
2. Hydroseeding.
3. Sodding.
4. Turf renovation.

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation" and drawing designations for planting soils.

E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.

C. Product Certificates: For fertilizers, from manufacturer.

D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.6 CLOSEOUT SUBMITTALS

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

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf and meadow establishment.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Five years' experience in turf installation in addition to requirements in Section 014000 "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:

    a. Landscape Industry Certified Technician - Exterior.
    b. Landscape Industry Certified Lawncare Manager.
    c. Landscape Industry Certified Lawncare Technician.

5. Pesticide Applicator: State licensed, commercial.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

1.9 FIELD CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting completion.

1. Seed
   a. Spring: March 01 to May 15
   b. Fall: August 15 to October 15
2. Sod
   a. Spring: March 01 to June 15
   b. Fall: August 15 to October 15

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 SEED

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

B. Seed Species:

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

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

C. All seed and labeling must fully comply with the Code of Virginia and these specifications.

D. All seed must be state certified and blended in accordance with the Virginia Handbook of Seed Certification Standards.

E. All seed and labeling must fully comply with the Code of Virginia and Seeds Section.

F. Each bag shall contain proper label and certification tag.

2.2 TURFGRASS SOD

A. Turfgrass Sod: Virginia Certified (labeled), inspected and approved by the Virginia Department of Agriculture, complying with Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.

B. Turfgrass Species:
1. Shall be V.C.I.A. “Approved” turf comprised of Kentucky 31 Tall Fescue and Kentucky Blue Grasses, with percentages ranging from 80 to 100% and 20 to 0%, respectively.
2. Sod shall be a 90/10 mix with 90% of the mix consisting of a blend of at least three turf type tall fescues, and at least 10% Bluegrass. Approved varieties shall be selected “Turfgrass Variety Recommendations,” Virginia Cooperative Extension most recent edition. A copy of this publication can be obtained by visiting the Virginia Cooperative Extension website https://www.sites.ext.vt.edu/newsletter-archive/turfgrass/index.html.

    a. Thickness of Cut: The thickness of the roots and soil should be ½” to ¾”.
    b. Pad Size: Individual pieces of sod shall be cut to the supplier’s standard width and length. Maximum allowable deviation from standard widths and lengths shall be 5%. Broken pads and torn or uneven ends will not be acceptable.
    c. Strength of Sod Sections: Under ideal conditions, standard size sections of sod shall be strong enough to support their own weight and retain their size and shape when suspended vertically from a firm grasp on the upper 10% of the section without the use of netting. NOTE: Younger tall fescue will not be strong enough to pass this test but is still okay to use.
    d. Sod Viability: Sod shall not be harvested or transplanted under drought conditions.

C. Viable, dense, strongly rooted, not less than 2 years old.

D. Use only non-netted sod.

E. Top growth of sod shall be thick, matted, recently mowed and maintained at 2-1/2" inch cutting height.

F. Free of weeds and undesirable native grasses.

G. Strips 12 IN to 18 IN wide.

H. Mow prior to stripping from field.

I. Cut so 3/4 IN of soil is firmly attached to roots.

J. Not frozen or dormant.

2.3 FERTILIZERS

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.4 MULCHES

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

B. Sphagnum Peat Mulch: Partially decomposed sphagnum peat moss, finely divided or of granular texture, and with a pH range of 3.4 to 4.8.

C. Muck Peat Mulch: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent, and containing no sand.

D. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of less than 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

E. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

F. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

G. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

2.5 PESTICIDES

A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions

and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
3. Uniformly moisten excessively dry soil that is not workable or which is dusty.

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

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

3.2 PREPARATION

A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. General: Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation." Coordinate "Placing Planting Soil" Paragraph below with Section 329113 "Soil Preparation" or Section 329115 "Soil Preparation (Performance Specification)."

B. Placing Planting Soil: Place and mix planting soil in place over exposed subgrade.

1. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

D. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

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

B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.

C. Fill cells of erosion-control mat with planting soil and compact before planting.

D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.

1. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
2. Do not use wet seed or seed that is moldy or otherwise damaged.
3. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate of [7 to 8 lb/1000 sq. ft.

C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with erosion-control mats where indicated on Drawings; install and anchor according to manufacturer's written instructions.

F. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.

1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
2. Bond straw mulch by spraying with asphalt emulsion at a rate of 10 to 13 gal./1000 sq. ft. Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.

G. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

3.6 HYDROSEEDING

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

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

3.7 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across slopes exceeding 1:3.
2. Anchor sod on slopes exceeding 1:6 with biodegradable staples spaced as recommended by sod manufacturer but not less than two anchors per sod strip to prevent slippage.

C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

3.8 TURF MAINTENANCE

A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow Fescue/Kentucky Bluegrass to a height of 2 to 3 inches.

D. Turf Postfertilization: Apply slow-release fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.9 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches
2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
3. Satisfactory Plugged Turf: At end of maintenance period, the required number of plugs has been established as well-rooted, viable patches of grass, and areas between plugs are free of weeds and other undesirable vegetation.
4. Satisfactory Sprigged Turf: At end of maintenance period, the required number of sprigs has been established as well-rooted, viable plants, and areas between sprigs are free of weeds and other undesirable vegetation.

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.10 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.11 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

D. Remove nondegradable erosion-control measures after grass establishment period.

3.12 MAINTENANCE SERVICE

A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Turf Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:

1. Seeded Turf: From date of installation to end of warranty period.

    a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

2. Sodded Turf: From date of installation period to end of warranty period.

END OF SECTION 329200

APPENDIX A

Pre-Demolition Limited Regulated Hazardous Materials Survey Report

for

Warehouse Building, Arlington County
2700 Nelson Street
Arlington, VA 22206

Prepared for

Department of Environmental Services – Facilities Design & Construction
1400 N. Uhle Street, Suite 403
Arlington, VA 22201

Prepared by

JSK Environmental Consulting, LLC
13130 Peach Leaf Place
Fairfax, VA 22030

November 11, 2021

JSK Project Number JSK-2021-56

November 11, 2021

Arlington County Government
2100 Clarendon Blvd, Suite 511
Arlington, VA 22201

Attn: Ms. Cynthia Wilson, AIA, LEED, AP
Project Manager/Construction Management Specialist
Phone: 703-228-4438
E-mail: CWilson@arlingtonva.us

Sub: Pre-Demolition Limited Regulated Hazardous Materials Survey Report
Warehouse Building, Arlington County
2700 South Nelson Street
Arlington, VA 22206
JSK Project Number JSK-2021-56

Dear Ms. Wilson:

JSK Environmental Consulting, LLC (JSK) performed the Pre-Demolition Regulated Hazardous Materials Survey that you requested. This included a Limited Pre-Demolition Asbestos, Lead-based Paint and Hazardous Materials Survey at the subject property. JSK provided its services in general accordance with our proposal (JSK Proposal No.: JSK-2021-83), dated September 20, 2021.

JSK thanks you for choosing us as your consultant for this project. Please contact us at 703-980-0573 if you have any questions or we may be of further service.

Respectfully Submitted,

JSK ENVIRONMENTAL CONSULTING, LLC.

Nand Kaushik
Principal

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1 EXECUTIVE SUMMARY

JSK Environmental Consulting, LLC was retained by the Arlington County Government to conduct a pre-demolition regulated materials survey that included asbestos-containing materials (ACM), limited lead-based paint (LBP) screening, polychlorinated biphenyls (PCBs), and a visual hazardous materials survey within the subject property located at 2700 South Nelson Street in Arlington, Virginia. The survey was conducted on October 18, 2021, by Mr. Michael Allshouse, EPA-accredited and State of Virginia licensed asbestos inspector and LBP risk assessor and Mr. Nand Kaushik, EPA-accredited and State of Virginia licensed asbestos inspector.

The subject property is improved with a two-story warehouse building that has an address of 2700 South Nelson Street. The building structure actually consists of two buildings which are connected to each other. The second building located at the back has an address of 2701 South Nelson Street and fronts South Oakland Street to the west. The front of the building facing South Nelson Street is occupied by the Arlington Food Assistance Center (AFAC). It consists of open warehouse and kitchen space and front and back mezzanine areas that comprises several offices, a conference room, a copy room and a break room.

The building fronting Oakland Street is occupied by the Inner Ear Recording Studio and the Ben and Jerry ice cream company. The studio space consists of a recording studio, recording office, restrooms and storage closets. The floor area occupied by the studio is approximately 3,000 square feet. The Ben and Jerry company space consist of a warehouse/kitchen area, a restroom, mop sink area and a large open office space. The floor area occupied by the Ben and Jerry company is approximately 2,000 square feet. The mezzanine area at the back of the building adjacent to Oakland Street consist of mostly storage space with a few officers that are currently not being used. It appears that the construction of the building dates back to the 1950's. JSK understands that the client plans to demolish the building.

The Regulated Hazardous Material survey was conducted within the building that is proposed to be demolished. The purpose of the regulated material survey was to identify the presence of ACM, LBP, PCB, and other hazardous materials (petroleum products, VOC's, or other materials and chemicals labeled "hazardous") in exposed and/or accessible areas within the structure

Asbestos Survey Summary

The asbestos inspection and sampling were conducted on October 18, 2021, by asbestos inspectors Mr. Michael Allshouse and Mr. Nand Kaushik.

A total of 47 samples were collected from 21 suspect homogenous materials (HM) from the interior, exterior and the roof of the residential building during the asbestos survey. The samples were analyzed by polarized light microscopy (PLM). The U.S. Environmental Protection Agency (EPA), the U.S. Occupational Safety and Health Administration (OSHA) and State of Virginia define an ACM as any material containing greater than one percent (>1%) asbestos.

Laboratory analysis indicated the following ACMs at the subject property building:

- **Black Sink Bowl Mastic Coating** located in the Inner Ear Studio Kitchen**.**
- **White Exterior Window Glazing compound** located in the exterior metal window of the Inner Ear Studio.

JSK did not observe any assumed ACMs within the facility**.**

Limited Lead-Containing Paint Screening

In 1978, the Consumer Product Safety Commission banned the sale of lead-based paint to consumers, and its application to areas where consumers have direct access to painted surfaces. As a result of this ban, buildings painted prior to 1978 are suspected of containing leaded paint. The EPA and the U.S. Department of Housing and Urban Development (HUD) define a LBP as any coating having 0.5% lead by weight with laboratory analysis.

The LBP testing was performed using an x-ray fluorescence analyzer (XRF) to test painted, stained, or varnished interior permanent building components for the presence of lead. In addition, a visual assessment for paint condition was conducted in all rooms. The limited LBP Inspection was conducted in general accordance with the U.S. Department of Housing & Urban Development (HUD) "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing", 2012 Edition (HUD Guidelines) to identify LBP. While the HUD Guidelines were developed specifically for housing, both the Virginia Department of Environmental Quality (DEQ) and the U.S. Environmental Protection Agency (EPA) references these guidelines when testing for LBP in many facilities. According to DEQ Regulations, paint or varnishes are considered to be "lead-based" if lead levels of 1.0 mg/cm^2 or greater are measured using an XRF.

A total of 132 XRF readings, including calibrations, were performed. This survey was limited in nature and was not intended to be a comprehensive survey of all painted components within the facility. The condition of the painted surfaces was found to be generally in an intact condition. None of the XRF readings of component coatings, from the structures tested had XRF readings equal to or greater than the "positive" classification of 1.0 mg/cm^2.

Polychlorinated Biphenyls (PCBs) Caulking and Sealants Survey Summary

EPA regulations implementing the Toxic Substance Control Act (TSCA) prohibit the use of PCBs in caulk and other building materials manufactured with PCBs at levels greater than or equal to 50 ppm, including the continued use of such materials that are already in place.

JSK observed that the windows and the metal window frames did not have any caulking around them. Therefore, no caulk samples were collected for analysis of PCB's.

Other Hazardous Material Survey Summary

The purpose of this limited visual survey for other hazardous materials was to provide general information for this facility regarding the presence of suspect hazardous materials and chemicals. A visual survey was conducted to provide general information for this facility regarding the presence of suspect hazardous materials.

The following materials were considered suspect:

- Fire/emergency lights throughout the subject property (total of 5)
- Smoke detectors throughout the subject property (total of 6)
- Fire extinguishers throughout the subject property (total of 12)

- Fire alarm system in the Arlington Food Assistance Center area on the 1st floor
- Fluorescent lighting throughout the subject property. The lights were electronic with non PCB-containing ballasts.
- Motion Sensors (two on the main level and one on the upper level).

This summary does not contain all the information presented in the full report. The report should be read in its entirety to obtain a more complete understanding of the information provided and to aid in any decisions made or actions taken based on this information

2 INTRODUCTION

JSK Environmental Consulting, LLC was tasked by the Arlington Count Government, Department of Environmental Services (DES), Facilities Design and Construction Department to conduct a pre-demolition regulated Hazardous Materials survey at the warehouse building located at 2700 South Nelson Street in Arlington, Virginia. The survey was completed by a USEPA accredited and state of Virginia-licensed asbestos inspector and LBP risk assessor.

This survey report is organized into the following sections:

- Section 3 discusses the General Building and Survey Information.
- Section 4 discusses the Methodology.
- Section 5 discusses survey findings.
- Section 6 discusses conclusions and recommendations from the survey.

The following appendices were added to this report as supplemental information:

- Appendix A contains the laboratory report of the bulk sample analysis for asbestos and chain of custody.
- Appendix B contains a schematic layout of the facility and sample collection locations.
- Appendix C contains the XRF Field Log for the LBP survey and a schematic layout of the facility showing LBP locations.
- Appendix D contains the inspector and laboratory certifications; and
- Appendix E contains the Photo log of the asbestos samples collected from the facility, the LBP locations and hazardous materials identified at the subject property.

2.1 SCOPE OF SERVICES

The scope of services for this project consisted of conducting an asbestos, lead paint PCBs, and other hazardous materials survey, including inspection, sampling and analysis of accessible and exposed interior areas at the subject building that will be impacted by the demolition operations, including exterior materials and the roof.

The investigation included a review of client provided records or documents (if available), visual inspection of the subject area(s), asbestos sample collection, PLM asbestos sample analysis, quantification of ACMs, LBP assessment, and report preparation and review. No sampling was conducted for other suspect hazardous materials within the scope of this investigation.

Asbestos Survey

This survey was intended to identify all asbestos containing materials (ACM) as required by the EPA National Emission Standards for Hazardous Air Pollutants (NESHAP), the US Occupational Safety and Health Administration (OSHA) and the State of Virginia. Additional information relative to friability, quantity and condition is also provided to assist the owner or his representative in the appropriate decisions involved with renovation and demolition. Regulations pertaining to asbestos renovation and demolition surveys include 40 CFR Part 61 (EPA NESHAP), 29 CFR 1926.1101 (OSHA Asbestos in Construction) and applicable State of Virginia regulations.

Lead Paint Survey

This survey was intended to identify LBP in general accordance with the EPA, OSHA and the HUD Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing.

Polychlorinated Biphenyls Caulking and Sealants Survey

This survey was intended to identify PCBs in caulking and sealants in general accordance with the EPA TSCA regulations.

Hazardous Materials Investigation

The purpose of the proposed scope of services was to visually inspect the extent and identify hazardous materials. JSK visually inspected for and quantify chemicals found at the location, including but not limited to: cleaning chemicals, maintenance chemicals, paints, hydraulic equipment, above ground storage tanks, underground storage tanks, batteries, acids and photographic development; PCB and mercury containing items (ballasts, fluorescent light bulbs, thermostats, smoke detectors, exit signs); blood borne pathogens containers and the identification and quantification of containers/storage vessels associated with the spaces. No sampling was conducted for this assessment.

2.2 PURPOSE

The purpose of this survey was to provide general information for the subject building regarding the presence, condition, and quantity of accessible and/or exposed building materials that contain asbestos, LBP and other hazardous materials, prior to the planned demolition of the building.

2.3 AUTHORIZATION

Authorization to perform this work was given on October 7, 2021, through the issuance of a Standard Purchase Order Number 292836 issued by the Arlington County Government. The project was conducted in accordance with the scope, terms and conditions of JSK's signed Proposal No. JSK-2021-83, dated September 20, 2021.

2.4 LIMITATIONS

Asbestos

This asbestos survey was intended to meet the requirements of the EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) for Asbestos demolition or renovation. The survey included a thorough inspection of accessible interior, exterior and roof areas of the subject property prior to demolition.

The survey included the interior, exterior and roof of the facility.

Destructive sampling, such as behind finished surfaces (plaster/drywall walls, above hard ceilings, etc.); inside mechanical chases, behind mirrored walls, under carpet or tiled floors, etc., was generally conducted to try to assess inaccessible or concealed materials. Void spaces which were evaluated included locations of suspected pipe or HVAC chases, wall cavities where fireproofing or other ACM was suspected, above finished ceiling

systems where ACM was likely to exist, within pipe trenches or within concealed locations. Although JSK made an attempt to identify all areas of ACM, an exhaustive investigation of void spaces was not included in the scope of services for this project. There may exist conditions which were unable to be identified within the scope of this survey.

Inaccessible is defined as areas of the building that were locked, or where admittance was not permitted. It also includes areas/materials that could not be tested (sampled) without destruction of the structure or a portion of the structure, and areas/materials that could not be safely reached by the inspector or inspection team. In the event that access to a portion of the building was not obtained (which otherwise would have been tested), such limitations specifically are identified in the Findings Section of this report.

JSK did not sample any system which presented a hazard to the inspection team such as energized electrical systems or within confined spaces.

JSK did not collect samples from building elements where the intended use would be compromised by testing, such as fire rated doors, vapor barriers, mirror mastics, etc.

Lead Paint

The limited inspection for lead-containing paints was not intended to be an exhaustive survey of all paints on the exterior of the building but a representation of the type of materials and components painted with lead-containing paint. The scope was not intended to comply with the strict requirements of a HUD lead-based paint inspection.

Polychlorinated Biphenyls

Limited sampling of potential PCB-containing caulking and sealants was proposed to be conducted from select window frames within the subject property building. However, JSK observed that the windows had been recently replaced in the past 10 years or so and the wooden window frames did not have any caulking around them. Therefore, no caulk samples were collected for analysis of PCB's.

Other Hazardous Materials

The other hazardous materials investigation was a visual survey only, no sampling was conducted.

2.5 WARRANTY

The field and laboratory results reported herein are considered sufficient in detail and scope to determine the presence of accessible and/or exposed suspect ACM associated with the building structure. JSK warrants that the findings contained herein have been prepared in general accordance with accepted professional practices at the time of its preparation as applied by professionals in the community. Changes in the state of the art or in applicable regulations cannot be anticipated and have not been addressed in this report.

The survey and analytical methods have been used to provide the client with information regarding the presence of accessible and/or exposed suspect ACM existing at the time of the inspection. Test results are valid only for the material(s) tested. There is a distinct possibility that conditions may exist which could not be identified within the

scope of the study or which were not apparent during the site visit. This inspection covered only those areas that were exposed and/or physically accessible to the Inspector. The study is also limited to the information available from the client at the time it was conducted.

No other warranties are implied or expressed.

3 GENERAL BUILDING AND SURVEY INFORMATION

3.1 BUILDING INFORMATION

Subject Property:	Warehouse Building, Arlington County 2700 South Nelson Street Arlington, VA 22206
Facility Construction Date:	According to the Arlington County property records the subject property building was originally constructed in the 1950's.
Previous Renovation Dates:	It has been renovated over the years, but the last renovation date is unknown.
Number of Floors:	Two.
Approximate Size (SF)	5,000 SF on main level and 3,000 square feet or so in the mezzanine areas.
Construction Type	The exterior walls of the Building are CMU. The interior walls and ceiling are a combination of concrete and gypsum drywall. The interior floors of the building are covered with a combination of concrete and carpeting and ceramic floor tiles. The bathrooms are covered with vinyl floor tiling.
Building Occupant(s):	The front of the building facing South Nelson Street is occupied by the Arlington Food Assistance Center (AFAC). The building fronting Oakland Street is occupied by the Inner Ear Recording Studio and the Ben and Jerry ice cream company.
Additional Information:	The scope of the survey included the interior, exterior and roof of the building only.

3.2 INSPECTION INFORMATION

Name of JSK Inspector(s):	Mr. Michael Allshouse Virginia Asbestos Inspector License Number: 3303003902. Virginia LBP Inspector License: 3356001040 Mr. Nand Kaushik Virginia Asbestos Inspector License Number: 3303004514
Date(s) of Inspection:	October 18, 2021
Escort:	JSK was unescorted during the survey.

4 METHODOLOGY

Inspection and sampling procedures were performed in general accordance with the guidelines published by the U.S. Environmental Protection Agency (EPA). The inspection and survey described below was performed by an EPA accredited and State of Montana-licensed asbestos inspector.

4.1 RECORD DOCUMENT REVIEW

Prior to conducting the visual inspection, JSK reviewed documents provided by the client, including drawings, floor plans, historical data, maintenance records, previous survey reports, laboratory reports, etc. for information regarding construction history and building materials.

The following documents were reviewed as a part of this Asbestos Survey:

- Site Layout Plans and Photographs– Provided by the Client.

4.2 ASBESTOS SURVEY METHODOLOGY

Inspection Procedures

An initial individual building structure walkthrough was conducted to determine the presence of suspect asbestos-containing materials that were accessible and/or exposed within the interior, exterior and roof of the building.

Destructive investigation, such as behind finished surfaces (plaster/drywall walls, above hard ceilings, etc.); inside mechanical chases, behind mirrored walls, under carpet or tiled floors, etc., was generally conducted in a limited fashion to try to assess inaccessible or concealed materials. The inspection team selected a few representative areas to perform an intrusive evaluation of void spaces within the building or structure. Such inspections were made by creating an opening of sufficient size to determine the presence, condition and quantity of suspect ACM within. Although JSK made an attempt to identify all areas of ACM, an exhaustive investigation of void spaces was not included in the scope of services for this project. There may exist conditions which were unable to be identified within the scope of this survey. JSK did not collect samples from building elements where the intended use would be compromised by testing, such as fire rated doors, vapor barriers, mirror mastics, etc.

Materials which were similar in color, texture, general appearance and which appear to have been installed at the same time were grouped in Homogeneous Sampling Areas. Such materials are termed "homogeneous materials" by the EPA. During this walkthrough, the approximate locations of these homogeneous materials were also noted.

The inspector evaluated the overall condition of the material and determined whether the materials were friable or non-friable by touching the material, where practical. A friable material is defined as any material able to be crushed, crumbled, pulverized or reduced to a powder by hand press when dry.

Each material was further assessed for overall condition. Conditions were rated as good, damaged or significantly damaged. JSK's inspector also identified the EPA classification of the material: Regulated ACM (RACM), Category I non-friable ACM, and Category II non-friable ACM, based on the materials current condition. JSK's inspector provided estimated quantities of the materials identified as ACM, based only on materials that were accessible and exposed.

Sampling Procedures

Following the walkthrough, the Inspector collected samples of suspect materials.

EPA guidelines were used to determine the sampling protocol. Sampling locations were chosen to be representative of the homogeneous sampling area. While an effort was made to collect samples randomly, samples were taken preferentially from areas already damaged or areas which were the least visible to minimize disturbance of the material.

Each sample location was sprayed with amended water and was kept wet during the entire sampling process. Samples were collected by coring through the material from the surface down to the base substrate. All layers of the material were extracted in placed into a sample container for transport to the laboratory. Sample containers were sealed and labeled with a unique sample identification number. Where appropriate, sampled materials were sealed with an encapsulant or covered with tape after sampling. JSK is not responsible for restoring the sampled areas to their pre-sampled condition.

Laboratory Analysis

All samples were analyzed at Aerobiology Laboratory located at 43760 Trade Center Place, Suite 100, Sterling, VA. The Aerobiology Laboratory is a National Voluntary Laboratory Accreditation Program (NVLAP) Accredited and an American Industrial Hygiene Association (AIHA) Accredited Laboratory. A copy of the Laboratory's Accreditation certificate is included in Appendix C.

The samples were analyzed for asbestos on a "positive-stop" basis by polarized light microscopy (PLM) in accordance with the "EPA Method for the Determination of Asbestos in Bulk Building Materials" (EPA/600/R-93/116 July 1993). Analysis was performed by visually observing the bulk samples with a stereoscope followed by slide preparation(s) for microscopic examination and identification.

Using a stereoscope, the microscopist visually estimated relative amounts of each constituent by determining the volume of each constituent in proportion to the total volume of the sample. Next, the samples were mounted on slides and then analyzed for asbestos (chrysotile, amosite, crocidolite, anthophyllite, actinolite/tremolite), and fibrous non-asbestos constituents (mineral wool, fiberglass, cellulose, etc.). Asbestos was identified by refractive indices, morphology, color, pleochroism, birefringence, extinction characteristics, and signs of elongation. The same characteristics were used to identify the non-asbestos constituents.

The EPA method allows samples which are visually determined to have less than 10% asbestos to be quantified using a Point Count procedure. An ocular reticule (cross hair or point array) is used to visually superimpose a point or points on the microscope field of view. A total of 400 points superimposed on either asbestos fibers or non-asbestos matrix material must be counted over at least eight different preparations of representative subsamples. If an asbestos fiber and matrix particle overlap so that a point is superimposed on their visual intersection, a point is scored for both categories. Point counting provides a quantification of the area percent asbestos. No samples were point counted for this survey.

4.3 LEAD-BASED PAINT SURVEY METHODOLOGY

Survey Methodology

JSK inspected all accessible areas of the subject property building. The survey was conducted in general accordance with HUD Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (HUD 1995). The JSK inspector used an LPA-1 XRF Spectrum Analyzer manufactured by RMD to perform the LBP testing. The LPA-1 is an XRF spectral analyzing system for quantitative measurement of lead in paint on various substrates. In each interior area of the building, XRF testing was performed on representative components with painted, stained, or varnished surfaces. Representative components are considered those in the same room, type of component, substrate, and visible color of paint. The inspector also assessed the general condition of the painted surfaces, according to the following guidelines:

- Good indicates there is no damage to the paint
- Fair indicates that the paint is cracking but not peeling
- Poor indicates that the paint is cracked and peeling

Sampling Methodology

Paint containing greater than or equal to 1.0 mg/cm^2 (or 0.5 percent by weight) lead by XRF testing or by laboratory analysis is considered LBP. The JSK inspector operated the XRF device in "Quick Mode" for testing (standardized in accordance with the equipment instruction manual) and programmed the unit with an action level of 1.0 mg/cm^2. In "Quick Mode," the XRF device seeks the shortest time period to assure a definitive measurement with 95 percent confidence (2 sigma). The LPA-1 analyzer concludes a measurement once the 2-sigma confidence level is achieved, typically between 2 to 4 seconds, depending on the lead content.

XRF calibration checks against known LBP standards were performed on the LPA-1 according to the instrument's operating guidelines. The quality control readings were used to monitor the performance of the LPA-1. The calibration-check readings were taken before testing began and after the testing was completed using a Standard Reference Material paint film, developed by the National Institute of Standards and Technology. All calibration check readings were within acceptable limits.

XRF testing values were collected by placing the LPA-1 scanner on the surface to be tested and exposing the paint film to gamma radiation. XRF analyzers are usually capable of penetrating up to 3/8 inch of paint to determine lead content. At the conclusion of each test, the shutter closes and the display on the control console shows the lead concentration in mg/cm^2 for manual tabulation. Test readings of 0.9 mg/cm^2 or below are negative for LBP. Test readings of 1.0 mg/cm^2 or above are positive for LBP.

There were no areas where XRF readings were inconclusive, therefore, no paint chip samples were collected for laboratory analysis.

Section 5.2 provides a summary of the LBP survey results for the facility

4.4 OTHER HAZARDOUS MATERIALS SURVEY METHODOLOGY

Inspection Procedures

JSK conducted a hazardous material inspection which included a visual inspection to determine the extent and identify hazardous materials. JSK visually inspected for and quantified chemicals found within the buildings, including but not limited to: cleaning chemicals, maintenance chemicals, paints, hydraulic equipment, above ground storage tanks, underground storage tanks, batteries, acids and photographic development; Polychlorinated Biphenyls (PCB) and mercury containing items (ballasts, fluorescent light bulbs, thermostats, smoke detectors, exit signs); blood borne pathogens containers and the identification and quantification of containers/storage vessels associated with the spaces.

No sampling was conducted for hazardous materials within the scope of this investigation.

5 FINDINGS

5.1 ASBESTOS RESULTS

JSK collected a total of 47 samples from 21 suspect homogenous materials (HM) from the subject property. Table 1 lists the materials that were sampled, along with the results of the inspection and laboratory analysis.

Laboratory analysis indicated the following ACMs at the subject property building:

- **Black Sink Bowl Mastic Coating (HM11-1 and HM11-2)** located in the Inner Ear Studio Kitchen**.**
- **White Exterior Window Glazing Compound (HM15-1 and HM15-2)** located in the exterior metal window of the Inner Ear Studio.

JSK did not observe any assumed ACMs within the facility.

The "Report of Bulk Sample Analysis for Asbestos", Sample Location diagram and Photographs are included in the Appendices. Table 1 on the following pages list the suspect asbestos-containing materials observed throughout the building that will be impacted by the demolition operations. Table 1 lists the materials that were sampled, along with the results of the inspection and laboratory analysis. The table also gives a description of the materials, their general locations, condition, friability, EPA NESHAP Category, and estimated quantity for abatement.

Inaccessible Areas

JSK did not encounter any inaccessible areas.

Regulatory Guidelines

ACM Definition - The EPA & OSHA consider a material to be asbestos-containing if at least one sample from the homogeneous area shows asbestos in an amount greater than 1%.

Point Count Quantification - If a material is found to contain less than 10% asbestos via visual estimation, it can be treated as non-ACM per EPA Regulations, if verified to contain 1% or less asbestos by the Point Count Quantification Procedure. If not point counted, a sample in which asbestos was visually detected and estimated (including trace to ≤1%) must be assumed to be greater than 1% and treated as ACM. Please refer to the laboratory analyses for a more detailed description of the microscopic analysis of individual samples. No samples were quantified by the Point Count Procedure in this Asbestos Survey.

EPA NESHAP Category - EPA classifies ACM into the following categories:

- ***RACM*** is any (a) Friable asbestos material, (b) Category I non-friable ACM that has becomes friable, (c) Category I non- friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or (d) Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.

- ***Category I Non-friable ACM*** includes packings, gaskets, resilient floor covering, and asphalt roofing products which contain more than one percent asbestos.
- ***Category II Non-friable ACM*** includes any material, except for a Category I non-friable ACM, which contains more than one-percent asbestos and cannot be reduced to a powder by hand pressure when dry.

OSHA – OSHA requires all suspect materials to be analyzed by layer, even materials such as drywall/joint compound, which may sometimes be composited per the EPA. If any layer contains asbestos in a concentration >1%, the material is considered an ACM.

OSHA has a classification system (I thru IV) for ACM depending on the type of material and the disturbance as follows:

- ***'Class I'*** work is defined as activities involving the removal of ACM or presumed ACM (PACM) that is thermal system insulation (TSI) and surfacing materials.
- ***'Class II'*** activities involve removal of ACM/PACM other than TSI or surfacing material.
- ***'Class III'*** work includes repair and maintenance operations which are likely to disturb ACM/PACM.
- ***'Class IV'*** work includes maintenance and custodial activities during which employees contact but do not disturb ACM/PACM.

Materials where asbestos is detected, but where point counting is conducted and determined that the concentration is ≤1% asbestos, are not considered to be ACM by OSHA. However, these materials are considered unclassified asbestos work per OSHA. Some OSHA work control practices and prohibitions will still apply, with the extent depending on whether the worker's exposure to airborne asbestos exceeds the OSHA permissible exposure limit (PEL).

Additional details of the OSHA asbestos regulations related to the construction industry can be found in 29 CFR part 1926.1101.

Quantification

Quantification of suspect asbestos-containing materials was conducted using visual estimation by a licensed asbestos inspector. This visual estimation was performed in accordance with generally accepted practices in the asbestos industry based on materials that were accessible and exposed. These values are sufficiently accurate for the purpose of documenting the presence of asbestos within its space for the purpose of identifying abatement control conditions or for general policy considerations. Actual quantities may differ between visually estimated values and physical measurements. If a licensed asbestos abatement contractor is engaged to remove asbestos containing materials, the abatement contractor is responsible for verifying reported quantities of ACM.

TABLE 1 – SUSPECT ACMs SAMPLED – Warehouse Building, 2700 Nelson Street, Arlington, VA 22006							
HM NUMBER (SAMPLE NUMBERS)	**MATERIAL DESCRIPTION**	**MATERIAL SAMPLE LOCATION**	**F/NF[1]**	**COND.[2]**	**% ASBESTOS & TYPE[3]**	**EPA NESHAP CAT [4]**	**ESTIMATED QUANTITY**
HM 1 (HM1-1 to HM1-3)	White DW w/White JC	Throughout the AFAC area	NF	Good	DW: NAD JC: NAD	N/A	N/A
HM 2 (HM2-1 to HM2-2)	Grey Caulk	Interior Door, 2nd Floor Mezzanine, AFAC Area	NF	Good	NAD	N/A	N/A
HM 3 (HM3-1 to HM3-3)	2'X4' White Textured LCT (dots with dashes design)	all of 1st floor and 2nd floor Mezzanine area at AFAC and part of 2nd Floor Front Mezzanine Area	NF	Good	NAD	N/A	N/A
HM 4 (HM4-1 to HM4-2)	Grey 4" Vinyl CB w/Cream and Yellow Mastic	throughout 1st Floor and 2nd floor Mezzanine in AFAC Area	NF	Good	CB: NAD Mastic: NAD	N/A	N/A
HM 5 (HM5-1 to HM5-2)	Grey 12" X 12" VFT with associated Light-Yellow Mastic	throughout 1st Floor and Restrooms in 2nd floor Mezzanine, AFAC Area	NF	Good	VFT: NAD Mastic: NAD	N/A	N/A
HM 6 (HM6-1 to HM6-3)	White DW w/White JC	Throughout Ben and Jerry Area	NF	Good	DW: NAD JC: NAD	N/A	N/A
HM 7 (HM7-1 to HM7-2)	Black 4" Vinyl CB w/Light Yellow Mastic	Throughout Ben and Jerry Area	NF	Good	CB: NAD Mastic: NAD	N/A	N/A

TABLE 1 – SUSPECT ACMs SAMPLED – Warehouse Building, 2700 Nelson Street, Arlington, VA 22006							
HM NUMBER (SAMPLE NUMBERS)	**MATERIAL DESCRIPTION**	**MATERIAL SAMPLE LOCATION**	**F/NF[1]**	**COND.[2]**	**% ASBESTOS & TYPE[3]**	**EPA NESHAP CAT [4]**	**ESTIMATED QUANTITY**
HM 8 (HM8-1 to HM8-3)	White DW w/White JC	Throughout Inner Studio Area	NF	Good	DW: NAD JC: NAD	N/A	N/A
HM 9 (HM9-1 to HM9-2)	Black 4" Vinyl CB w/Tan Mastic	Throughout Inner Studio Area	NF	Good	CB: NAD Mastic: NAD	N/A	N/A
HM 10 (HM10-1 to HM10-2)	Green Geometric Pattern Peel & Stick 12" X 12" VFT w/Yellow Mastic	Kitchen area of the Inner Ear Studio	NF	Good	Grout: NAD	N/A	N/A
HM 11 (HM11-1 to HM11-2)	**Black Sink Bowl Mastic Coating**	**Kitchen area of the Inner Ear Studio**	**NF**	**Good**	**2% CH**	**Cat II NF**	**25 SF**
HM 12 (HM12-1 to HM12-2)	Grey Exterior Door Caulk	Outside Ben & Jerry Space	NF	Good	NAD	N/A	N/A
HM 13 (HM13-1 to HM13-2)	Dark Grey Exterior Door Caulk	Outside the Inner Ear Studio	NF	Good	NAD	N/A	N/A
HM 14 (HM14-1 to HM14-2)	White Exterior Window Caulk	Outside the Inner Ear Studio	NF	Good	NAD	N/A	N/A
HM 15 (HM15-1 to HM15-2)	**White/Off-White exterior Window glazing compound**	**Exterior Metal Window on the side of the Inner Ear Studio**	**NF**	**Good**	**2% CH**	**Cat II NF**	**75 LF**
HM 16 (HM16-1 to HM16-2)	Grey Wall Expansion Joint Caulk	Exterior Wall of Building	NF	Good	NAD	N/A	N/A
HM 17 (HM17-1 to HM17-2)	Black flashing caulk	Lower Roof	NF	Good	NAD	N/A	N/A

TABLE 1 – SUSPECT ACMs SAMPLED – Warehouse Building, 2700 Nelson Street, Arlington, VA 22006							
HM NUMBER (SAMPLE NUMBERS)	**MATERIAL DESCRIPTION**	**MATERIAL SAMPLE LOCATION**	**F/NF[1]**	**COND.[2]**	**% ASBESTOS & TYPE[3]**	**EPA NESHAP CAT [4]**	**ESTIMATED QUANTITY**
HM 18 (HM18-1 to HM18-2)	Black asphalt Sheet Roofing	Upper Roof	NF	Good	NAD	N/A	N/A
HM 19 (HM19-1 to HM19-2)	Grey Caulk – White/Grey Parapet wall Cap Caulk	Upper Roof	NF	Good	NAD	N/A	N/A
HM 20 (HM20-1 to HM20-2)	Grey Mastic – HVAC Duct Mastic	Lower Roof	NF	Good	NAD	N/A	N/A
HM 21 (HM21-1 to HM21-3)	2’ X 2’ White textured pinhole LCT	Portion of the 2nd Floor Front Mezzanine Area	NF	Good	NAD	N/A	N/A

1 F = Friable; NF = Non-friable.
2 Cond. = Condition of Materials: Either good, dam = damaged., sig. dam. = significant damage
3 NAD = No Asbestos Detected, Ch = Chrysotile, Am = Amosite, DW = Drywall; JW = Joint Compound; VFT = Vinyl Floor Tile; CB = Cove Base; CFT = Ceramic Floor Tile; CWT = Ceramic Wall Tile; LCT = Lay-in Ceiling Tile; RSF = Resilient Sheet Flooring; LF = Linear Feet; SF = Square Feet.
4 NESHAP Category - Regulated ACM (RACM), Cat I NF=Category I Non-Friable ACM, Cat II NF= Category II Non-Friable ACM.

Sample identification is the HM Number followed by the Sample Number (e.g. HM1 (1-1 to 1-3))

5.2 LBP SCREENING RESULTS

JSK visually inspected and tested representative painted, stained, or varnished structural building components accessible at the subject property Building. A total of 132 XRF readings, including calibrations, were performed. This survey was limited in nature and was not intended to be a comprehensive survey of all the painted components within the facility. The condition of the painted surfaces was found to be generally in an intact condition. LBP was detected in just one exterior surface tested within the building.

Painted surfaces were tested using an XRF instrument operated in "Quick Mode." XRF test readings of 0.9 milligram per square centimeter (mg/cm^2) or below are negative for lead-based paint. XRF test readings of 1.0 mg/cm^2 or above are positive for lead-based paint. Painted surfaces testing greater than 1 mg/cm^2 (or 0.5 percent by weight) are considered to be lead-based by USEPA, HUD, and IDPH. XRF test results are included in Appendix C.

As part of the Limited LBP Inspection, painted surfaces were visually examined for general condition and were generally categorized as being in intact or deteriorated condition. The paint condition in all the rooms tested with the XRF were found to be generally intact and in good condition.

None of the XRF reading of component coatings, from the structures tested had XRF readings equal to or greater than the "positive" classification of 1.0 mg/cm^2.

Regulatory Guidelines

LBP Definition –

The EPA and HUD defines "lead-based paint" as any "paint, surface coating that contains lead equal to or exceeding one milligram per square centimeter (1.0 mg/cm^2) or 0.5% lead by weight."

EPA – Renovation, Repair and Painting Program

EPA's Lead Renovation, Repair and Painting Rule (RRP Rule) requires that firms performing renovation, repair, and painting projects that disturb lead-based paint in homes, child care facilities and pre-schools built before 1978 have their firm certified by EPA (or an EPA authorized state), use certified renovators who are trained by EPA-approved training providers and follow lead-safe work practices.

OSHA –

The current OSHA standard (29 CFR 1926.62) for lead exposure in construction has a permissible exposure limit (PEL) of 50 micrograms per cubic meter of air (50 $\mu g/m^3$), measured as an 8-hour time-weighted average (TWA). As with all OSHA health standards, when the PEL is exceeded, the hierarchy of controls requires employers to institute feasible engineering and work practice controls as the primary means to reduce and maintain employee exposures to levels at or below the PEL. When all feasible engineering and work practice controls have been implemented but have proven inadequate to meet the PEL, employers must nonetheless implement these controls and must supplement them with appropriate respiratory protection. The employer also must ensure that employees wear the respiratory protection provided when it is required.

HUD –

The *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (2012 Edition)* enforce HUD's vision to reduce hazards in housing in a cost-effective manner while protecting the health of children. These guidelines are used by those who are required to identify and control lead paint hazards, as well as property owners, landlords, and child-care center operators. Helpful advice on renovations in older housing, lead-based paint inspections and risk assessments, and where to go for help can be found in the guidelines. The guidelines also outline what users have to do to meet requirements and recommendations; identify training – and if applicable, certification – required for people who conduct the work; and describe how the work should be done.

5.3 OTHER HAZARDOUS MATERIALS SURVEY RESULTS

A visual survey for hazardous materials was performed to determine the presence and locations of suspect hazardous materials in the subject building. No materials were found to be suspect within the interior of the subject property.

Regulatory Guidelines

Hazard Materials Definition –

By definition, EPA determined that some specific wastes are hazardous. These wastes are incorporated into lists published by the EPA. These lists are organized into three categories:

1. The F-list (non-specific source wastes). This list identifies wastes from common manufacturing and industrial processes, such as solvents that have been used in cleaning or degreasing operations. Because the processes producing these wastes can occur in different sectors of industry, the F-listed wastes are known as wastes from non-specific sources. Wastes included on the F-list can be found in the regulations at 40 CFR §261.31.

2. The K-list (source-specific wastes). This list includes certain wastes from specific industries, such as petroleum refining or pesticide manufacturing. Certain sludges and wastewaters from treatment and production processes in these industries are examples of source-specific wastes. Wastes included on the K-list can be found in the regulations at 40 CFR §261.32.

3. The P-list and the U-list (discarded commercial chemical products). These lists include specific commercial chemical products in an unused form. Some pesticides and some pharmaceutical products become hazardous waste when discarded. Wastes included on the P- and U-lists can be found in the regulations at 40 CFR §261.33.

Waste that have not been specifically listed may still be considered a hazardous waste if exhibits one of the four characteristics defined in 40 CFR Part 261 Subpart C - ignitability (D001), corrosivity (D002), reactivity (D003), and toxicity (D004 - D043).

1. Ignitability - Ignitable wastes can create fires under certain conditions, are spontaneously combustible,

or have a flash point less than 60 °C (140 °F). Examples include waste oils and used solvents.

2. Corrosivity - Corrosive wastes are acids or bases (pH less than or equal to 2, or greater than or equal to 12.5) that are capable of corroding metal containers, such as storage tanks, drums, and barrels.

3. Reactivity - Reactive wastes are unstable under "normal" conditions. They can cause explosions, toxic fumes, gases, or vapors when heated, compressed, or mixed with water.

Toxicity - Toxic wastes are harmful or fatal when ingested or absorbed (e.g., containing mercury, lead, etc.). When toxic wastes are land disposed, contaminated liquid may leach from the waste and pollute ground water. Toxicity is defined through a laboratory procedure called the Toxicity Characteristic Leaching Procedure (TCLP) (Method 1311). The TCLP helps identify wastes likely to leach concentrations of contaminants that may be harmful to human health or the environment.

Polychlorinated Biphenyls (PCB's)

- A visual inspection of a "representative number" of light fixtures and ballasts, and inspection for transformers, hydraulic lifts, etc. was performed to determine the possible presence of PCBs. The visual inspection was conducted with a Phillips Advanced handheld ballast checker, which indicates whether a ballast is magnetic or electronic. The device is aimed at the light fixture and the LED turns green if the light source is powered by an electronic ballast; or turns orange if powered by an electromagnetic ballast. Electronic ballasts are non-PCB so they can be immediately ruled-out as suspect PCBs. The electromagnetic ballasts may or may not contain PCBs and are considered to be suspect PCB-containing.

Mercury

- A visual inspection was performed for the purpose of identifying the potential presence, location and estimated quantity of fluorescent light bulbs, mercury thermostats and exit signs. During the assessment, JSK observed and quantified suspect mercury bulbs and mercury vapor lamps associated with fluorescent light fixtures. No sampling was performed of the lamps or bulbs. Reportable quantities of mercury are often found in fluorescent lamps, high intensity discharge lamps and thermostats. Because of this fact, the fluorescent lamps found at the site should be considered a hazardous waste for mercury under the Resource Conservation and Recovery Act (RCRA); 40 CFR 261. Unless Toxic Characteristic Leachate Procedure (TCLP) testing for mercury is performed, the light tubes located at the property should be assumed to exceed the regulatory limit of 0.2 milligrams per liter for mercury. These tubes must be disposed of as mercury containing waste unless testing proves otherwise.

A summary of the hazardous materials and chemicals found at the facility is as follows.

Table 2: Hazardous Materials Summary – Warehouse Building, 2700 Nelson Street, Arlington, VA 22006

Material	Observed Yes/No	Estimated Quantity	General Location
PCB Fluorescent Light Ballasts	No	N/A	N/A

Table 2: Hazardous Materials Summary – Warehouse Building, 2700 Nelson Street, Arlington, VA 22006			
Material	**Observed Yes/No**	**Estimated Quantity**	**General Location**
Fluorescent Light Bulbs	Yes	25 to 30 sets of dual lights	Throughout the subject property including the AFAC, Inner Ear Studio and the Ben & Jerry's spaces, and the mezzanine areas.
Fire Extinguishers	Yes	At least 12	Throughout the subject property including the AFAC, Inner Ear Studio and the Ben & Jerry's spaces, and the mezzanine areas.
Mercury Vapor Lights	No	N/A	N/A
Household Cleaning Chemicals, commercially available	Yes	Few spray bottles	Mostly in the janitorial closet of the AFAC area
Mercury Thermostats/ Thermometers	No	N/A	N/A
Smoke Detectors	Yes	At least 6	Throughout the subject property including the AFAC, Inner Ear Studio and the Ben & Jerry's spaces, and the mezzanine areas.
Motion Sensors	Yes	3	Mainly in the AFAC space.
Fire/Emergency Lighting	Yes	3	Mainly in the AFAC space
Fire Alarm System	Yes	2	One in the AFAC space and one in the Inner Ear Studio

6 CONCLUSIONS & RECOMMENDATIONS

6.1 CONCLUSIONS

Asbestos

ACM was found within the areas at the subject property building that will be impacted by the demolition operations. ACM was found in only a small section of the property, one in the interior space and one in the exterior of the building.

JSK did not observe any assumed ACMs within the subject property Building.

Materials with low concentrations of asbestos (trace to 1%) were not identified in the subject property Building.

Lead-Based Paint Screening

Lead was not detected above the regulatory level for an LBP in paint tested in the subject property Building that will be impacted by the demolition operations.

PCB Caulking

Samples for PCB caulking and sealants were not collected within the subject property building. As indicated earlier, JSK observed that the windows and the wooden window frames did not have any caulking around them. Therefore, no caulk samples were collected for analysis of PCB's.

Suspect Hazardous Materials

Some hazardous materials were identified in the Subject Property Building that will be impacted by the demolition operations.

6.2 RECOMMENDATIONS

The following recommendations are provided for the Asbestos, LBP or other Hazardous Materials that were detected or identified during this investigation.

Asbestos

JSK found asbestos containing materials during the survey. The identified regulated ACM (RACM) should be maintained in a good non-damaged condition until the building is demolished.

The identified RACM (HM 11 and HM 15) must be properly removed by a licensed asbestos abatement contractor prior to renovations or demolition that would disturb the material. Federal, State and Local regulations and guidelines should be strictly adhered to when removing the ACM.

Prior to any future maintenance, renovation, or demolition activities, and newly discovered suspect ACMs or previously identified materials that were not sampled in the renovation location should be tested. Any areas that

were noted as being inaccessible during this project or any concealed areas, such as behind walls, where suspect ACMs are discovered, will require a survey for ACM.

Prior to the initiation of a project that would involve abatement, a detailed engineering cost estimate and project design is recommended. The engineering cost estimate will incorporate such variables as scheduling and phasing of the project, the size, and extent of the project, seasonal factors, operation factors, and other restrictions, respiratory protection, alternate abatement options, and type of replacement material. An engineering cost estimate would also include professional fees, such as for project design and management, and other expenses, such as on-site air monitoring and construction supervision.

If, during demolition or renovation activities, previously unidentified suspect ACMs are discovered in concealed areas, such as behind walls, they should be sampled for asbestos, or they must be treated as ACM.

Lead Paint

Lead was not detected above the regulatory level for an LBP in paint tested in the subject property Building that will be impacted by the demolition operations. No further action is required at this time.

PCB Caulking

Based on the findings of this assessment, no further action is required for PCBs at the Subject Property.

Other Hazardous Materials

JSK recommends disposing the hazardous materials identified on the site in accordance with applicable regulations. Any unknown containers present on the site need to be verified through testing followed by proper disposal in accordance with applicable regulations.

APPENDIX A – REPORT OF BULK SAMPLE ANALYSIS FOR ASBESTOS AND CHAIN OF CUSTODY

Aerobiology Laboratory Associates, Incorporated
Expertise Since 1997

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Certificate of Analysis

JSK Environmental Services, LLC
13130 Peach Leaf Place
Fairfax, VA 22030
Attn: Nand Kaushik
Client Project Name: Arlington County W'House, Nelson Street

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NVLAP LAB CODE 200829-0

Date Collected: 10/18/21
Date Received: 10/19/21
Date Analyzed: 10/25/21
Date Reported: 10/25/21
Project ID: 21046442

Test Requested: 3002, Asbestos in Bulk Samples

Method: Polarized Light Microscopy (PLM): EPA 600/R-93/116: Method for Asbestos in Bulk Building Materials, EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method for Asbestos in Bulk Insulation Samples

Sample Identification		Physical Description of Sample; Additional Comments	Homo-geneous (yes/no)	Number of Layers	Percentage of Sample (%)	Asbestos Detected		Non-Asbestos Fibers (area %)	Non-Fibrous Material (area %)	Matrix Material (composition)
Client	Lab Sample Number					Chrysotile (%)	Amphibole (%)			
HM1-1	21046442-001a	White Drywall	Yes	1	70	ND1	ND1	CELL (15) FBG (2)	83	C, OP, G
	21046442-001b	White Joint Compound	Yes	1	30	ND1	ND1		100	C, OP, M
HM1-2	21046442-002a	White Drywall	Yes	1	60	ND1	ND1	CELL (20) FBG (2)	78	C, OP, G
	21046442-002b	White Joint Compound	Yes	1	40	ND1	ND1		100	P, C, OP, M
HM1-3	21046442-003a	White Drywall	Yes	1	40	ND1	ND1	CELL (20) FBG (2)	78	C, OP, G
	21046442-03b	White Joint Compound	Yes	1	60	ND1	ND1		100	C, OP, M
HM2-1	21046442-004	Grey Caulk	Yes	1	100	ND1	ND1		100	C, B, OP
HM2-2	21046442-005	Grey Caulk	Yes	1	100	ND1	ND1		100	C, B, OP
HM3-1	21046442-006	Painted Beige Fibrous Material	Yes	1	100	ND1	ND1	CELL (40) MW (30)	30	P, C, OP
HM3-2	21046442-007	Painted Beige Fibrous Material	Yes	1	100	ND1	ND1	CELL (40) MW (30)	30	P, C, OP

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ND1 = None Detected
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Ashley Dodson
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Cathleen Piccione
Technical Supervisor

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Test Requested: 3002, Asbestos in Bulk Samples
Method: Polarized Light Microscopy (PLM): EPA 600/R-93/116: Method for Asbestos in Bulk Building Materials, EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method for Asbestos in Bulk Insulation Samples

Sample Identification		Physical Description of Sample; Additional Comments	Homo-geneous (yes/no)	Number of Layers	Percentage of Sample (%)	Asbestos Detected		Non-Asbestos Fibers (area %)	Non-Fibrous Material (area %)	Matrix Material (composition)
Client	Lab Sample Number					Chrysotile (%)	Amphibole (%)			
HM3-3	21046442-008	Painted Beige Fibrous Material	Yes	1	100	ND1	ND1	CELL (40) MW (30)	30	P, C, OP
HM4-1	21046442-009a	Grey Floor Tile	Yes	1	95	ND1	ND1		100	C, B, OP
	21046442-009b	Yellow Mastic	Yes	1	5	ND1	ND1	CELL (3)	97	C, B, OP
HM4-2	21046442-010a	Grey Floor Tile	Yes	1	95	ND1	ND1		100	C, B, OP
	21046442-010b	Yellow Mastic	Yes	1	5	ND1	ND1	CELL (2)	98	C, B, OP
HM5-1	21046442-011a	Grey Cove Base	Yes	1	95	ND1	ND1		100	C, B, OP
	21046442-011b	Light Yellow Mastic	Yes	1	5	ND1	ND1		100	C, B, OP
HM5-2	21046442-012a	Grey Cove Base	Yes	1	95	ND1	ND1		100	C, B, OP
	21046442-012b	Light Yellow Mastic	Yes	1	5	ND1	ND1	CELL (2)	98	C, B, OP

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Project ID: 21046442

Test Requested: 3002, Asbestos in Bulk Samples

Method: Polarized Light Microscopy (PLM): EPA 600/R-93/116: Method for Asbestos in Bulk Building Materials, EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method for Asbestos in Bulk Insulation Samples

Sample Identification		Physical Description of Sample; Additional Comments	Homo-geneous (yes/no)	Number of Layers	Percentage of Sample (%)	Asbestos Detected		Non-Asbestos Fibers (area %)	Non-Fibrous Material (area %)	Matrix Material (composition)
Client	Lab Sample Number					Chrysotile (%)	Amphibole (%)			
HM6-1	21046442-013a	White Drywall	Yes	1	20	ND1	ND1	CELL (15)	85	C, OP, G
	21046442-013b	White Joint Compound	Yes	1	80	ND1	ND1		100	C, OP, M
HM6-2	21046442-014a	White Drywall	Yes	1	80	ND1	ND1	CELL (15)	85	C, OP, G
	21046442-014b	White Joint Compound	Yes	1	20	ND1	ND1		100	C, OP, M
HM6-3	21046442-015a	White Drywall	Yes	1	70	ND1	ND1	CELL (15)	85	C, OP, G
	21046442-015b	White Joint Compound	Yes	1	30	ND1	ND1		100	C, OP, M
HM7-1	21046442-016a	Black Cove Base	Yes	1	95	ND1	ND1		100	C, B, OP
	21046442-016b	Light Yellow Mastic	Yes	1	5	ND1	ND1		100	C, B, OP
HM7-2	21046442-017a	Black Cove Base	Yes	1	95	ND1	ND1		100	C, B, OP
	21046442-017b	Light Yellow Mastic	Yes	1	5	ND1	ND1		100	C, B, OP

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Test Requested: 3002, Asbestos in Bulk Samples

Method: Polarized Light Microscopy (PLM): EPA 600/R-93/116: Method for Asbestos in Bulk Building Materials, EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method for Asbestos in Bulk Insulation Samples

Sample Identification		Physical Description of Sample; Additional Comments	Homo-geneous (yes/no)	Number of Layers	Percentage of Sample (%)	Asbestos Detected		Non-Asbestos Fibers (area %)	Non-Fibrous Material (area %)	Matrix Material (composition)
Client	Lab Sample Number					Chrysotile (%)	Amphibole (%)			
HM8-1	21046442-018a	White Drywall	Yes	1	50	ND1	ND1	CELL (20)	80	C, OP, G
	21046442-018b	White Joint Compound	Yes	1	50	ND1	ND1		100	C, OP, M
HM8-2	21046442-019a	White Drywall	Yes	1	85	ND1	ND1	CELL (15)	85	C, OP, G
	21046442-019b	White Joint Compound	Yes	1	15	ND1	ND1		100	C, OP, M
HM8-3	21046442-020a	White Drywall	Yes	1	85	ND1	ND1	CELL (15)	85	C, OP, G
	21046442-020b	White Joint Compound	Yes	1	15	ND1	ND1		100	C, OP, M
HM9-1	21046442-021a	Black Cove Base	Yes	1	95	ND1	ND1		100	C, B, OP
	21046442-021b	Tan Mastic	Yes	1	5	ND1	ND1		100	C, B, OP
HM9-2	21046442-022a	Black Cove Base	Yes	1	95	ND1	ND1		100	C, B, OP
	21046442-022b	Tan Mastic	Yes	1	5	ND1	ND1		100	C, B, OP

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Sample Identification		Physical Description of Sample; Additional Comments	Homo-geneous (yes/no)	Number of Layers	Percentage of Sample (%)	Asbestos Detected		Non-Asbestos Fibers (area %)	Non-Fibrous Material (area %)	Matrix Material (composition)
Client	Lab Sample Number					Chrysotile (%)	Amphibole (%)			
HM10-1	21046442-023a	Green Sheet Flooring	Yes	1	95	ND1	ND1		100	C, B, OP
	21046442-023b	Yellow Mastic	Yes	1	5	ND1	ND1	CELL (3)	97	C, B, OP
HM10-2	21046442-024a	Green Sheet Flooring	Yes	1	95	ND1	ND1		100	C, B, OP
	21046442-024b	Yellow Mastic	Yes	1	5	ND1	ND1		100	C, B, OP
HM11-1	**21046442-025**	**Black Mastic**	**Yes**	**1**	**100**	**2**	**ND1**		**98**	**T, C, B, OP**
HM11-2	**21046442-026**	**Black Mastic**	**Yes**	**1**	**100**	**2**	**ND1**		**98**	**T, C, B, OP**
HM12-1	21046442-027	Grey Caulk	Yes	1	100	ND1	ND1		100	C, B, OP
HM12-2	21046442-028	Grey Caulk	Yes	1	100	ND1	ND1		100	C, B, OP
HM13-1	21046442-029	Dark Grey Caulk	Yes	1	100	ND1	ND1	FBG (2)	98	C, B, OP
HM13-2	21046442-030	Dark Grey Caulk	Yes	1	100	ND1	ND1	FBG (2)	98	C, B, OP

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Client	Lab Sample Number					Chrysotile (%)	Amphibole (%)			
HM14-1	21046442-031	White Caulk	Yes	1	100	ND1	ND1		100	C, B, OP
HM14-2	21046442-032	White Caulk	Yes	1	100	ND1	ND1		100	C, B, OP
HM15-1	**21046442-033**	**Off-White Non-Fibrous Material**	**Yes**	**1**	**100**	**2**	**ND1**		**98**	**C, B, OP**
HM15-2	**21046442-034**	**White Non-Fibrous Material**	**Yes**	**1**	**100**	**2**	**ND1**		**98**	**C, B, OP**
HM16-1	21046442-035	Grey Caulk	Yes	1	100	ND1	ND1		100	C, B, OP
HM16-2	21046442-036	Grey Caulk	Yes	1	100	ND1	ND1		100	C, B, OP
HM17-1	21046442-037	Black Semi-Fibrous Tar	Yes	1	100	ND1	ND1	CELL (20)	80	T, C, B, OP
HM17-2	21046442-038	Black Semi-Fibrous Tar	Yes	1	100	ND1	ND1	CELL (20)	80	T, C, B, OP
HM18-1	21046442-039	Black Tarry Semi-Fibrous Material with Stones	Yes	1	100	ND1	ND1	SYN (25)	75	Q, T, C, B, OP
HM18-2	21046442-040	Black Tarry Semi-Fibrous Material with Stones	Yes	1	100	ND1	ND1	SYN (25)	75	Q, T, C, B, OP

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Client	Lab Sample Number					Chrysotile (%)	Amphibole (%)			
HM19-1	21046442-041	Grey Caulk	Yes	1	100	ND1	ND1	CELL (5)	95	C, B, OP
HM19-2	21046442-042	Grey Caulk	Yes	1	100	ND1	ND1	CELL (5)	95	C, B, OP
HM20-1	21046442-043	Grey Mastic	Yes	1	100	ND1	ND1	CELL (3)	97	C, B, OP
HM20-2	21046442-044	Grey Mastic	Yes	1	100	ND1	ND1	CELL (3)	97	C, B, OP
HM21-1	21046442-045	Painted Tan Fibrous Material	Yes	1	100	ND1	ND1	CELL (45) MW (25)	30	P, C, OP
HM21-2	21046442-046	Painted Tan Fibrous Material	Yes	1	100	ND1	ND1	CELL (45) MW (25)	30	P, C, OP
HM21-3	21046442-047	Painted Tan Fibrous Material	Yes	1	100	ND1	ND1	CELL (45) MW (25)	30	P, C, OP

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General Notes

- **ND1** indicates no asbestos was detected; the method detection limit is 1%.
- **Trace or "<1"** indicates asbestos was identified in the sample, but the concentration is less than 1% as determined by the minimum counting standards of CVE (calibrated visual estimate) or point counting. Due to the inherent uncertainty of the quantification techniques employed during analysis, verification of the results by a more accurate and precise method is recommended.
- All regulated asbestos minerals (i.e. chrysotile, amosite, crocidolite, anthophyllite, tremolite, and actinolite) were sought in every layer of each sample, but only those asbestos minerals detected are listed. Amosite is the common name for the asbestiform variety of the mineral grunerite. Crocidolite is the common name used for the asbestiform variety of the mineral riebeckite.
- Tile, vinyl, foam, plastic, and fine powder samples may contain asbestos fibers of such small diameter (< 0.25 microns in diameter) that these fibers cannot be detected by PLM. For such samples, more sensitive analytical methods (e.g. TEM, SEM, and XRD) are recommended if greater certainty about asbestos content is required. Semi-quantitative bulk TEM floor tile analysis is accepted under the NESHAPS regulations.
- Samples identified as inhomogeneous (containing more that one layer) shall be divided into individual layers and each layer tested separately. The results for each individual layer shall be listed separately on the report.
- These results are submitted pursuant to Aerobiology's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which the results are used or interpreted.
- Aerobiology Laboratory shall be responsible for all the information provided in the report, except when information is provided by the customer. Aerobiology Laboratory is not responsible for the sampling activity. Data provided by a customer can affect the validity of results and shall be clearly identified. The report shall not be reproduced except in full without the approval of the laboratory to ensure that parts of a report are not taken out of context.
- Unless notified in writing to return the samples covered by this report, Aerobiology Laboratory will store the samples for a minimum period of 3 months before discarding. A shipping and handling charge will be assessed for the return of any samples.
- This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
- This test report relates only to the items tested or calibrated.
- This report is not valid unless it bears the name of a NVLAP-approved signatory.
- Any reproduction of this document must include the entire document in order for the report to be valid.

Arlington County W'house, Nelson Street

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CDC's ELITE Program
AZ, CA, CO, GA, VA, NJ

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NVLAP Lab Code 200829-0 (VA)
NVLAP Lab Code 500097-0 (AZ)
NVLAP Lab Code 201076-1 (CA)

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LAP #163063 (GA)
LAP #102977 (VA)
LAP #210229 (AZ)
LAP #102747 (NJ)
LAP #218981 (CA)

Aerobiology Client	JSK Environmental Services, LLC					
Field Contact	Nand Kaushik				Collected By/Date: Nand Kaushik - 10-18-21	Relinquished By/Date: Nand Kaushik / 10-19-21
Reporting Address	13130 Peach Leaf Pl, Fairfax, VA 22030				Relinquished By/Date:	Received By/Date: SNF 10/19/21
Billing Address	Same as above				Sampler Type: Andersen ____ SAS ____	SampleAire ____ AeroTrap ____ Other ____ BioCulture ____
Phone/Fax	703-980-0573				PO# /Job#:	
Reporting Email(s)	nand@jskenvironmental.com				Project Name:	
Routine	24 Hour	Same Day	4 Hour	2 Hour	5 Day (Asbestos Only)	Notes:
SAMPLING LOCATION ZIP CODE	22207				CC Info: need results by COB 10-25-21	

	Sample No.	Test Code	Sample Location	Total Volume/Area
1	HM1-1	3002	White Drywall with White Joint Compound throughout	
2	HM1-2		—11—	
3	HM1-3		—11—	
4	HM2-1		Grey Interior Door Caulk, Mezzanine	
5	HM2-2		—11—	
6	HM3-1		2'by 4' White Textured LCT in all 1st Floor and mezzanine + part of mezzanine in Back	
7	HM3-2		—11—	
8	HM3-3		—11—	
9	HM4-1		Grey 4" Vinyl Cove Base with cream + yellow mastic throughout 1st floor + mezzanine	
10	HM4-2		—11—	
11	HM5-1		Grey 12"x12" Vinyl floor Tile and tan mastic throughout 1st Floor + Restrooms in mezzanine	
12	HM5-2		—11—	
13	HM6-1, HM6-2		White Drywall with White Joint Compound throughout Basement area	
14	and HM6-3		—11—	
15.				

1054	Direct, Non-viable Spore Trap	1015	Culture - WATER Legionella
1051	Direct, Qualitative- **Swab/Tape**	1017	Culture - SWAB Legionella
1050	Direct, Qualitative- **Bulk**	1010	WATER - Potable - E. coli/total coliforms
1005	AIR Culture - Bacterial Count w/ ID's	1012	SWAB - E. coli/total coliforms
1030	AIR Culture - Fungal Count w/ ID's	1028	SWAB - Sewage Screen (E. coli/Entero/fecal coliforms)
1006	SWAB Culture - Bacterial Count w/ ID's	2056	WATER - Heterotrophic Plate Count
1031	SWAB Culture - Fungal Count w/ ID's	3001	ASBESTOS - Point count
1008	BULK Culture - Bacterial Count w/ ID's	3002	ASBESTOS - PLM Analysis
1033	BULK Culture - Fungal Count w/ ID's	3003	ASBESTOS - Particle characterization
1007	WATER Culture - Bacterial Count w/ID's	3004	ASBESTOS - PCM Analysis

Arlington County W'house, Nelson Street

Aerobiology Laboratory Associates, Incorporated
Expertise Since 1997

Lab Use
210406442

CDC's ELITE Program
AZ, CA, CO, GA, VA, NJ

NVLAP
NVLAP Lab Code 200860-0 (CO)
NVLAP Lab Code 200829-0 (VA)
NVLAP Lab Code 500097-0 (AZ)
NVLAP Lab Code 201076-1 (CA)

AIHA LAP, LLC ACCREDITED LABORATORY
LAB #192683 (CO)
LAB #163063 (GA)
LAB #102977 (VA)
LAB #210229 (AZ)
LAB #102747 (NJ)
LAB #218981 (CA)

Aerobiology Client						
Field Contact		Collected By/Date:		Relinquished By/Date:		
Reporting Address		Relinquished By/Date:		Received By/Date: SNF 10/19/21		
Billing Address		Sampler Type	Andersen ____ SAS ____	SampleAire ____ AeroTrap ____	Other ____ BioCulture ____	
Phone/Fax		PO# /Job#:				
Reporting Email(s)		Project Name:				
Routine	24 Hour	Same Day	4 Hour	2 Hour	5 Day (Asbestos Only)	Notes:
SAMPLING LOCATION ZIP CODE					CC Info:	

		Sample No.	Test Code	Sample Location	Total Volume/Area
16	1	HM7-1	3002	Black 4" Vinyl Cove Base with Cream mastic throughout Ben+Jerry Area	
17	2	HM7-2		—" —	
18	3	HM8-1		White Drywall with White Joint Compont throughout Inner Studio Area	
19	4	HM8-2		—" —	
20	5	HM8-3		—" —	
21	6	HM9-1		Black 4" Vinyl Cove Base with Tan mastic throughout Inner Studio Area	
22	7	HM9-2		—" —	
23	8	HM10-1		Green Geometric Pattern Peel + Stick 12"x12" VFT in Studio Kitchen area	
24	9	HM10-2		—" —	
25	10	HM11-1		Black Sink Bowl Mastic Coating in Studio Kitchen	
26	11	HM11-2		—" —	
27	12	HM12-1		Grey Exterior Door Caulk (Ben+Jerry)	
28	13	HM12-2		—" —	
29	14	HM13-1 and HM13-2		Grey Exterior Door Caulk (Studio)	

AM 30

1054	Direct, Non-viable Spore Trap	1015	Culture - WATER Legionella
1051	Direct, Qualitative- **Swab/Tape**	1017	Culture - SWAB Legionella
1050	Direct, Qualitative- **Bulk**	1010	WATER - Potable - E. coli/total coliforms
1005	AIR Culture - Bacterial Count w/ ID's	1012	SWAB - E. coli/total coliforms
1030	AIR Culture - Fungal Count w/ ID's	1028	SWAB - Sewage Screen (E. coli/Entero/fecal coliforms)
1006	SWAB Culture - Bacterial Count w/ ID's	2056	WATER - Heterotrophic Plate Count
1031	SWAB Culture - Fungal Count w/ ID's	3001	ASBESTOS - Point count
1008	BULK Culture - Bacterial Count w/ ID's	3002	ASBESTOS - PLM Analysis
1033	BULK Culture - Fungal Count w/ ID's	3003	ASBESTOS - Particle characterization
1007	WATER Culture - Bacterial Count w/ID's	3004	ASBESTOS - PCM Analysis

Arlington County W'house, Nelson St.

Aerobiology Laboratory Associates, Incorporated
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Lab Use
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AZ, CA, CO, GA, VA, NJ

NVLAP Lab Code 200860-0 (CO)
NVLAP Lab Code 200829-0 (VA)
NVLAP Lab Code 500097-0 (AZ)
NVLAP Lab Code 201076-1 (CA)

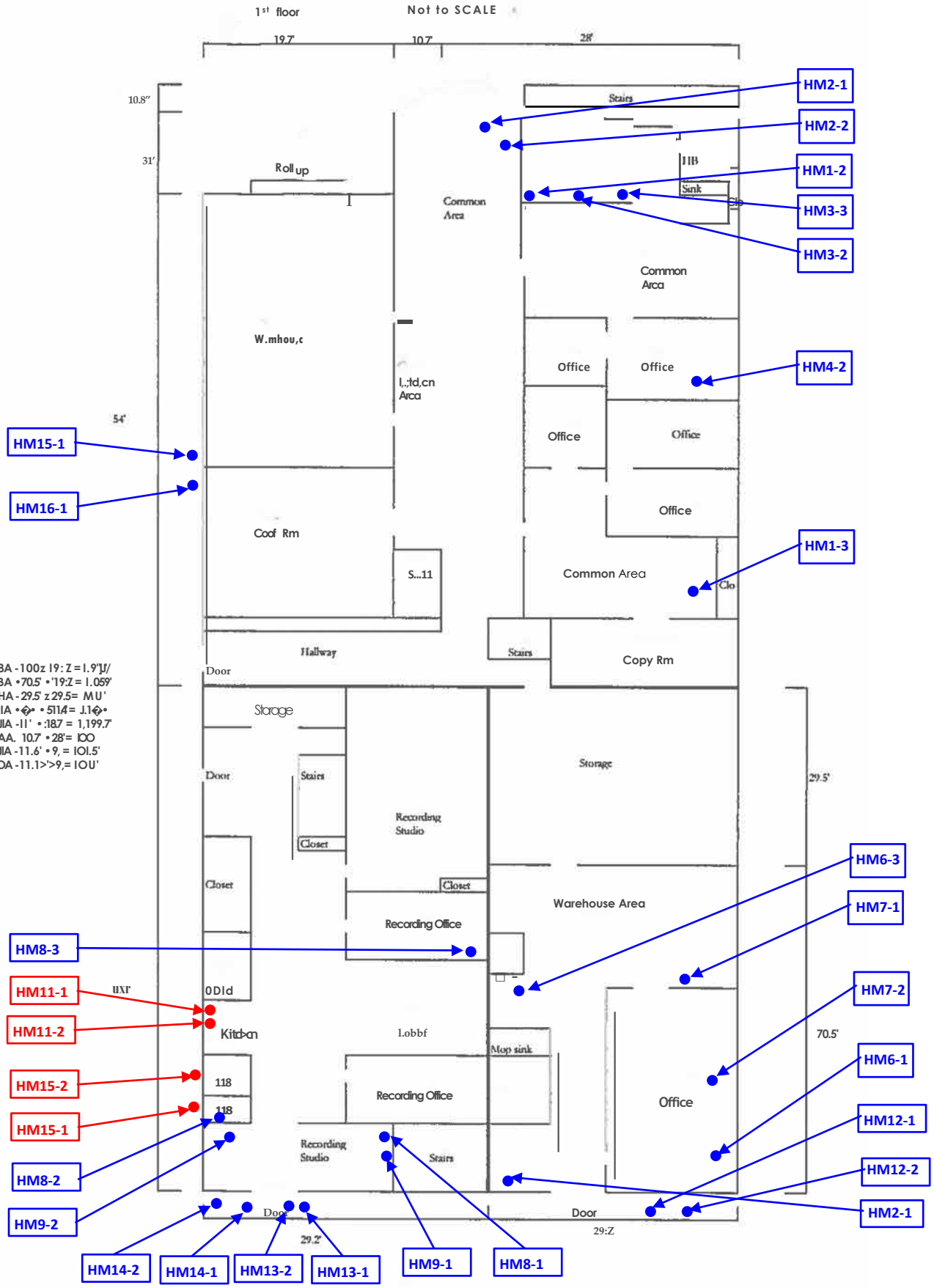
LAB #192683 (CO)
LAB #163063 (GA)
LAB #102977 (VA)
LAB #210229 (AZ)
LAB #102747 (NJ)
LAB #218981 (CA)

Aerobiology Client						
Field Contact					Collected By/Date:	Relinquished By/Date:
Reporting Address					Relinquished By/Date:	Received By/Date: SNF 10/19/21
Billing Address					Sampler Type: Andersen ____ SAS ____	SampleAire ____ AeroTrap ____ Other ____ BioCulture ____
Phone/Fax					PO# /Job#:	
Reporting Email(s)					Project Name:	
Routine	24 Hour	Same Day	4 Hour	2 Hour	5 Day (Asbestos Only)	Notes:
SAMPLING LOCATION ZIP CODE					CC Info:	

		Sample No.	Test Code	Sample Location	Total Volume/Area
31	1	HM14-1	3002	White Exterior window caulk (Studio)	
32	2	HM14-2		—11—	
33	3	HM15-1		White exterior window glazing compound (overall window on Studio)	
34	4	HM15-2		—11—	
35	5	HM16-1		Grey Exterior wall expansion joint caulk	
36	6	HM16-2		—11—	
37	7	HM17-1		Black flashing caulk on Lower Roof	
38	8	HM17-2		—11—	
39	9	HM18-1		Black asphalt sheet Roofing on Upper Roof	
40	10	HM18-2		—11—	
41	11	HM19-1		White/Gray Parapet wall Cap Caulk on Upper Roof	
42	12	HM19-2		—11—	
43 and 44	13	HM20-1 and HM20-2		Gray HVAC Duct Mastic on Lower Roof	
45 46 47	14	HM21-1, HM21-2 and HM21-3		2'x2' White Textured Pinhole, LCT on portion of mezzanine in Back.	

1054	Direct, Non-viable Spore Trap	1015	Culture - WATER Legionella
1051	Direct, Qualitative- **Swab/Tape**	1017	Culture - SWAB Legionella
1050	Direct, Qualitative- **Bulk**	1010	WATER - Potable - E. coli/total coliforms
1005	AIR Culture - Bacterial Count w/ ID's	1012	SWAB - E. coli/total coliforms
1030	AIR Culture - Fungal Count w/ ID's	1028	SWAB - Sewage Screen (E. coli/Entero/fecal coliforms)
1006	SWAB Culture - Bacterial Count w/ ID's	2056	WATER - Heterotrophic Plate Count
1031	SWAB Culture - Fungal Count w/ ID's	3001	ASBESTOS - Point count
1008	BULK Culture - Bacterial Count w/ ID's	3002	ASBESTOS - PLM Analysis
1033	BULK Culture - Fungal Count w/ ID's	3003	ASBESTOS - Particle characterization
1007	WATER Culture - Bacterial Count w/ID's	3004	ASBESTOS - PCM Analysis

APPENDIX B – SITE LAYOUT AND ACM SAMPLE LOCATION DRAWING

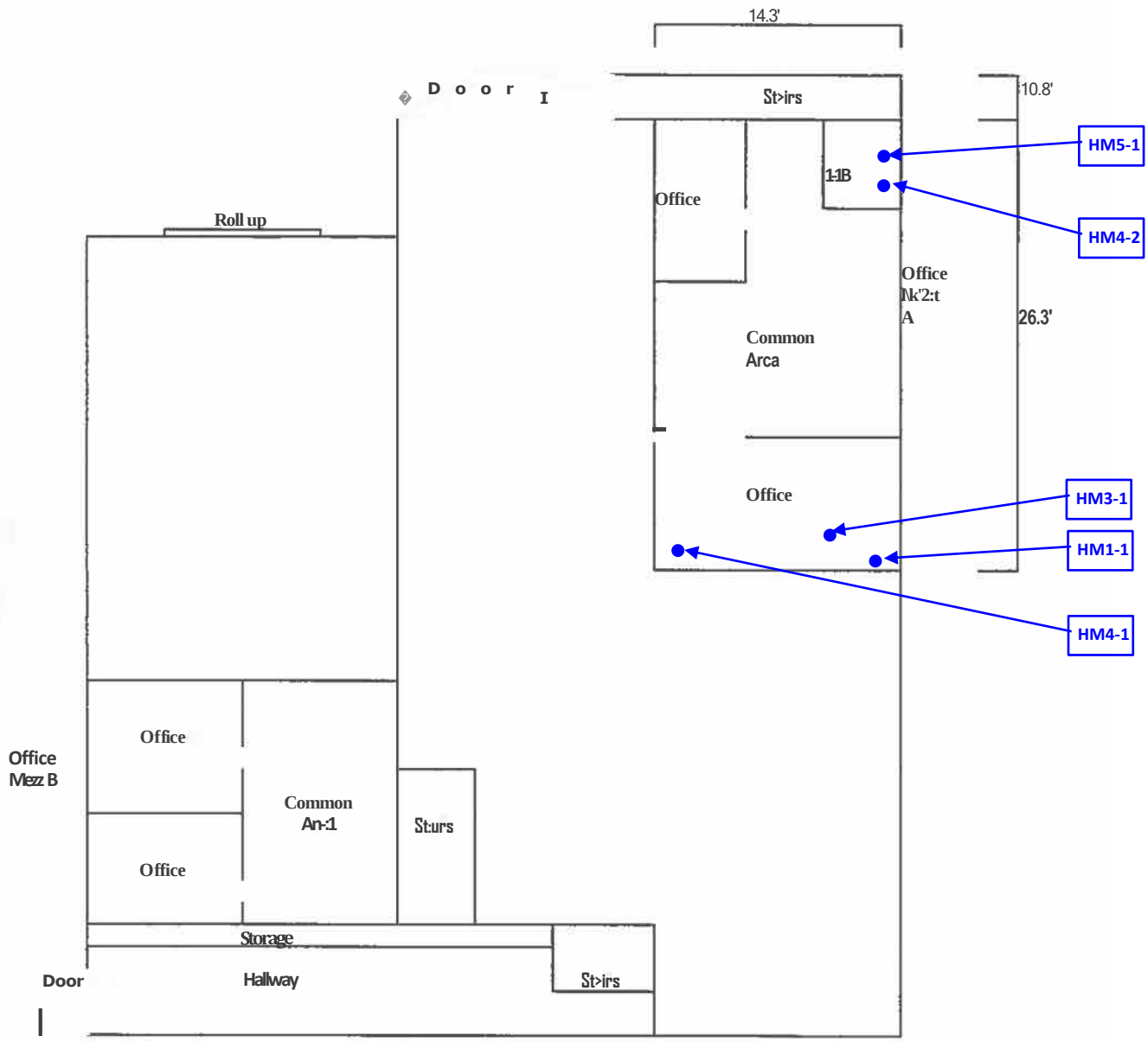


Inner Eat G8A - 100z 19: Z = 1.9'1J/
JI.:n& J.,,,, GBA •70.5' •'19:Z = 1.059'
Sr° """ GHA - 29.5' z 29.5= MU'
U I GIIA • • 5114 = J.1•
1_1 GJIA -11' •:187 = 1,199.7'
Stairwcll GAA. 10.7' •28'= 100
5.,,;,...cl] GJIA -11.6' • 9, = 101.5'
Sairwdl GOA -11.1>'>9,= 10U'

LEGEND	FIGURE 1 – 1st Floor	JSK Project No. : JSK-2021-56	N
# -# - Bulk Sample Location (non-ACM) # -# - Bulk Sample Location (ACM)	ACM Sample Location Site Map (Not to Scale)	Arlington County Warehouse 2700 South Nelson Street, Arlington, VA 22206	

2nd n. Mczz (front)

NOT to SCALE

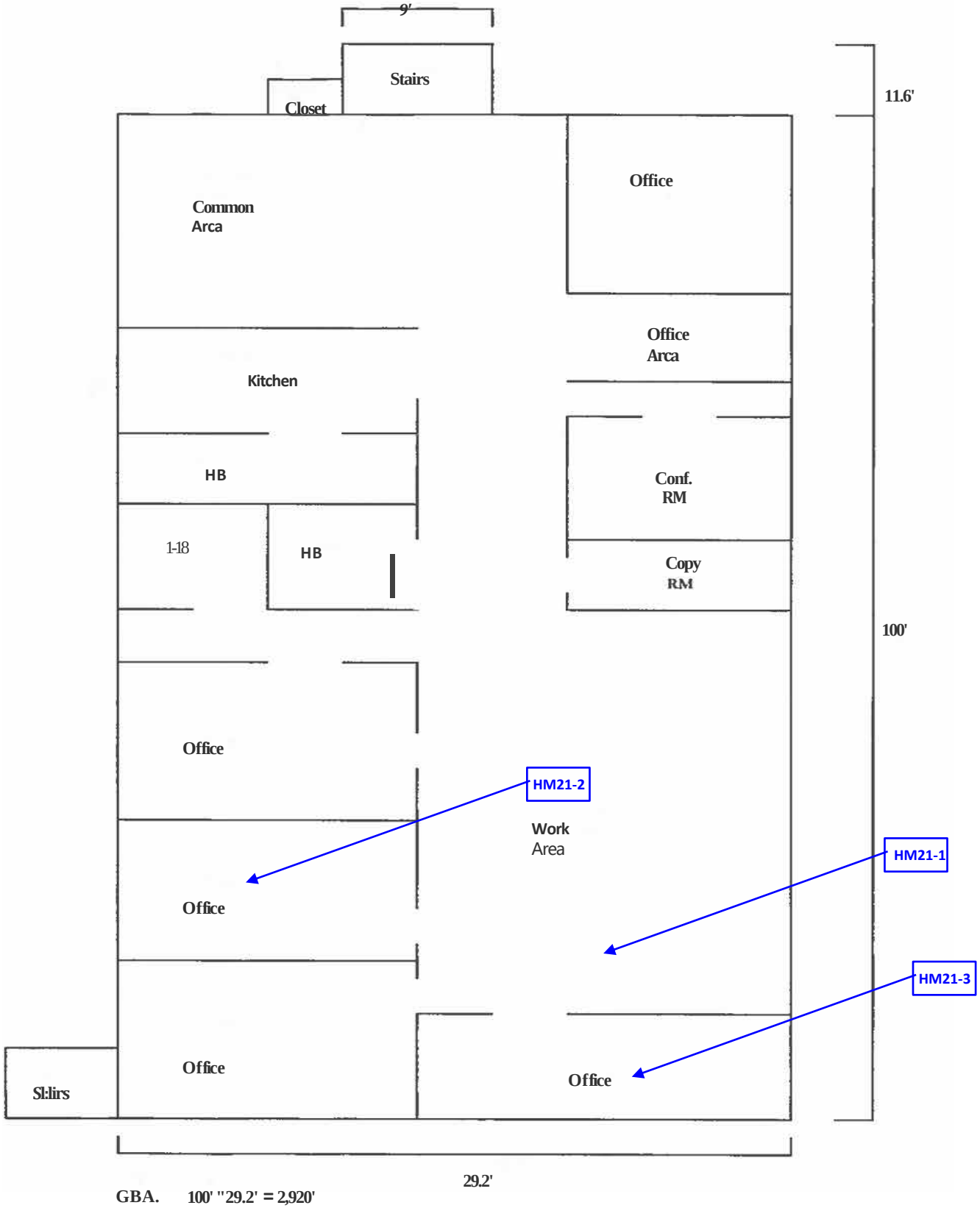


Office Mezz - A GBA - 14.3' x 26.3' = 376'
Office Mczz - B GBA-

LEGEND	FIGURE 2 – 2nd Floor Mezz (ACAC Area)	JSK Project No. : JSK-2021-56	N
# -# - Bulk Sample Location (non-ACM) # -# - Bulk Sample Location (ACM)	ACM Sample Location Site Map (Not to Scale)	Arlington County Warehouse 2700 South Nelson Street, Arlington, VA 22206	

2nd Door mczzaoic (back)

NOT to SCALE



GBA. 100' "29.2' = 2,920'

LEGEND	FIGURE 3 – 2nd Floor Mezz (Front)	JSK Project No. : JSK-2021-56	
# -# - Bulk Sample Location (non-ACM) # -# - Bulk Sample Location (ACM)	ACM Sample Location Site Map (Not to Scale)	Arlington County Warehouse 2700 South Nelson Street, Arlington, VA 22206	N

APPENDIX C – XRF SURVEY RESULTS FOR LBP ASSESSMENT AND LBP LOCATION DRAWING

Table 1: Lead Based Paint Survey XRF Readings

Project Number: JSK-2021-56
Project: Warehouse Building
Address: 2700 Nelson Street
Arlington, VA 22206
XRF Unit Started: 07.30 AM

Date: October 18, 2021
Operator: Michael Allshouse
XRF Total Readings: 132
XRF Unit Ended: 09.00 AM

Reading Date	Reading Number	Interior/ Exterior	Room ID	Structure	Substrate	Color	Paint Condition[A]	Reading (mg/cm^2)[B]	Result[C]
10/18/2021	1		Calibration					0.8	Average of 0.8
10/18/2021	2		Calibration					0.8	
10/18/2021	3		Calibration					0.9	
10/18/2021	4	Interior	AFAC Main Level Front Door	Door	Wood	Reddish brown	Intact	– 0.4	Negative
10/18/2021	5	Interior	Main Level Front Door	Door Casing	Wood	White	Intact	- 0.2	Negative
10/18/2021	6	Interior	AFAC Main Level	Wall	Drywall	White	Intact	– 0.5	Negative
10/18/2021	7	Interior	AFAC Main Level	Wall	CMU	Gray	Intact	– 0.6	Negative
10/18/2021	8	Interior		Side Door	Metal	White	Intact	– 0.4	Negative
10/18/2021	9	Interior		Side door casing	Metal	White	Intact	– 0.7	Negative
10/18/2021	10	Interior	AFAC Main Level, Conference Room	Door Casing	Wood	White	Intact	– 0.3	Negative
10/18/2021	11	Interior	AFAC Main Level, Conference Room	Window Casing	Wood	White	Intact	– 0.37	Negative
10/18/2021	12	Interior	AFAC Main Level, Conference Room	Baseboard	Wood	White	Intact	– 0.1	Negative
10/18/2021	13	Interior	AFAC Main Level, Conference Room	Wall	Drywall	Tan	Intact	– 0.5	Negative
10/18/2021	14	Interior	AFAC Main Level, Conference Room Closet	Door	Wood	White	Intact	– 0.5	Negative
10/18/2021	15	Interior	AFAC Main Level, Conference Room Closet	Door Casing	Wood	White	Intact	– 0.4	Negative
10/18/2021	16	Interior	AFAC Main Level, Conference Room	Wall	CMU	White	Intact	– 0.6	Negative
10/18/2021	17	Interior	AFAC Main Level, Conference Room	Floor	Concrete	Gray	Intact	– 0.5	Negative
10/18/2021	18	Interior	AFAC Main Level, Common Area	Wall	Drywall	White	Intact	– 0.4	Negative
10/18/2021	19	Interior	AFAC Main Level, Common Area	Ceiling	Metal	White	Intact	– 0.0	Negative

Reading Date	Reading Number	Interior/ Exterior	Room ID	Structure	Substrate	Color	Paint Condition[A]	Reading (mg/cm^2)[B]	Result[C]
10/18/2021	20	Interior	AFAC Main Level, Common Area	Ceiling Beam	Wood	White	Intact	– 0.7	Negative
10/18/2021	21	Interior	AFAC Main Level, Common Area	Door Casing	Wood	White	Intact	– 0.2	Negative
10/18/2021	22	Interior	AFAC Main Level, Common Area	Ceiling	Drywall	White	Intact	– 0.2	Negative
10/18/2021	23	Interior	AFAC Main Level, Common Area	Interior window	Wood	White	Intact	– 0.0	Negative
10/18/2021	24	Interior	AFAC Main Level, Common Area	Wall Beam	Metal	White	Intact	– 0.4	Negative
10/18/2021	25	Interior	AFAC Main Level, Office	Wall	Drywall	White	Intact	– 0.4	Negative
10/18/2021	26	Interior	AFAC Main Level, Office	Wall	CMU	White	Intact	– 0.5	Negative
10/18/2021	27	Interior	AFAC Main Level, Common Area Back	Wall	Drywall	Tan	Intact	– 0.2	Negative
10/18/2021	28	Interior	AFAC Main Level, Common Area Back	Ceiling	Metal	Black	Intact	– 0.0	Negative
10/18/2021	29	Interior	AFAC Main Level, Common Area Back	Window Sash	Wood	White	Intact	– 0.1	Negative
10/18/2021	30	Interior	AFAC Main Level, Common Area Back	Window Casing	Wood	White	Intact	– 0.7	Negative
10/18/2021	31	Interior	AFAC Main Level Conference Room at back	Door	Metal Gray	White	Intact	– 0.1	Negative
10/18/2021	32	Interior	AFAC Main Level Conference Room at back	Door Casing	Wood	White	Intact	– 0.1	Negative
10/18/2021	33	Interior	AFAC Main Level Conference Room at back	Wall	Drywall	Gray	Intact	– 0.2	Negative
10/18/2021	34	Interior	AFAC Main Level Conference Room at back	Chair Rail	Wood	White	Intact	– 0.0	Negative
10/18/2021	35	Interior	AFAC Main Level Conference Room at back	Lower Wall Panel	Wood	White	Intact	– 0.2	Negative
10/18/2021	36	Interior	AFAC Main Level Conference Room at back	Lower Wall Panel	Wood	Gray	Intact	– 0.2	Negative
10/18/2021	37	Interior	AFAC Main Level Conference Room at back	Baseboard	Wood	White	Intact	0.0	Negative
10/18/2021	38	Interior	AFAC Main Level Conference Room at back	Crown Molding	Wood	White	Intact	– 0.2	Negative
10/18/2021	39	Interior	AFAC Main Level Conference Room at back	Ceiling	Drywall	White	Intact	– 0.4	Negative
10/18/2021	40	Interior	AFAC Main Level Conference Room at back	Door	Wood	White	Intact	– 0.6	Negative
10/18/2021	41	Interior	AFAC Main Level Conference Room at back	Door Casing	Wood	White	Intact	– 0.1	Negative

Reading Date	Reading Number	Interior/ Exterior	Room ID	Structure	Substrate	Color	Paint Condition[A]	Reading (mg/cm^2)[B]	Result[C]
10/18/2021	42	Interior	AFAC Main Level Conference Room at back	Wall Column	Metal	White	Intact	– 0.4	Negative
10/18/2021	43	Interior	AFAC Area Mezzanine	Stair Riser	Wood	White	Intact	– 0.2	Negative
10/18/2021	44	Interior	AFAC Area Mezzanine	Stair Stringer	Wood	White	Intact	– 0.3	Negative
10/18/2021	45	Interior	AFAC Area Mezzanine	Baluster	Wood	White	Intact	– 0.4	Negative
10/18/2021	46	Interior	AFAC Area Mezzanine	Wall	Brick	White	Intact	– 0.3	Negative
10/18/2021	47	Interior	AFAC Area, Front Mezzanine	Stair Riser	Metal	Gray	Intact	– 0.4	Negative
10/18/2021	48	Interior	AFAC Area, Front Mezzanine	Stair Stringer	Metal	Gray	Intact	– 0.6	Negative
	49	Interior	AFAC Area, Front Mezzanine	Handrail	Metal	Gray	Intact	– 0.4	Negative
	50	Interior	AFAC Area, Front Mezzanine	Door	Metal	Gray	Intact	– 0.3	Negative
	51	Interior	AFAC Area, Front Mezzanine	Door Casing	Metal	White	Intact	– 0.1	Negative
	52	Interior	AFAC Area, Front Mezzanine, Office	Door Casing	Wood	White	Intact	– 0.2	Negative
	53	Interior	AFAC Area, Front Mezzanine, Office	Wall	Drywall	Yellow	Intact	– 0.3	Negative
	54	Interior	AFAC Area, Front Mezzanine, Office	Window casing	Wood	White	Intact	0.0	Negative
	55	Interior	AFAC Area, Front Mezzanine, Office	Wall	Drywall	Black	Intact	– 0.4	Negative
	56	Interior	AFAC Area, Front Mezzanine, Office	Wall	Drywall	Blue/ Gray	Intact	– 0.4	Negative
	57	Interior	AFAC Area, Front Mezzanine, Office	Window Casing	Wood	White	Intact	– 0.2	Negative
	58	Interior	AFAC Area, Front Mezzanine, Office	Bookcase	Wood	Maroon	Intact	– 0.5	Negative
	59	Interior	AFAC Area, Front Mezzanine, Office	Wall	Drywall	Blue	Intact	– 0.2	Negative
	60	Interior	AFAC Area, Back Warehouse	Door	Metal	Gray	Intact	– 0.3	Negative
	61	Interior	AFAC Area, Back Warehouse	Door Casing	Metal	Gray	Intact	0.1	Negative
	62	Interior	AFAC Area, Back Warehouse	Wall	CMU	White	Intact	– 0.1	Negative
	63	Interior	AFAC Area, Back Warehouse	Wall	Brick	White	Intact	– 0.2	Negative
	64	Interior	AFAC Area, Back Warehouse	Ceiling	Concrete	White	Intact	– 0.1	Negative
	65	Interior	AFAC Area, Back Warehouse	Floor	Concrete	Gray	Intact	– 0.4	Negative
	66	Interior	AFAC Area, Back Warehouse	Column	Metal	White	Intact	– 0.5	Negative
	67	Interior	AFAC Area, Back Warehouse	Door	Metal	White	Intact	– 0.1	Negative
	68	Interior	AFAC Area, Back Warehouse	Door Casing	Metal	White	Intact	– 0.2	Negative
	69	Interior	AFAC Area, 2nd Floor Front Mezzanine	Stair Post	Metal	Gray	Intact	– 0.4	Negative

Reading Date	Reading Number	Interior/ Exterior	Room ID	Structure	Substrate	Color	Paint Condition[A]	Reading (mg/cm^2)[B]	Result[C]
	70	Interior	AFAC Area, 2nd Floor Front Mezzanine	Handrail	Metal	Gray	Intact	– 0.7	Negative
	71	Interior	AFAC Area, 2nd Floor Front Mezzanine	Stringer	Metal	Gray	Intact	– 0.5	Negative
	72	Interior	AFAC Area, 2nd Floor Front Mezzanine	Wall	Drywall	Gray	Intact	– 0.7	Negative
	73	Interior	AFAC Area, 2nd Floor Front Mezzanine	Ceiling	Drywall	White	Intact	– 0.3	Negative
	74	Interior	AFAC Area, 2nd Floor Front Mezzanine	Door	Metal	Gray	Intact	– 0.4	Negative
	75	Interior	AFAC Area, 2nd Floor Front Mezzanine	Door Casing	Metal	Gray	Intact	– 0.1	Negative
	76	Interior	AFAC Area, 2nd Floor Front Mezzanine, Common Area	Wall	Drywall	White	Intact	– 0.1	Negative
	77	Interior	AFAC Area, 2nd Floor Front Mezzanine, Common Area	Ceiling	Drywall	White	Intact	– 0.0	Negative
	78	Interior	AFAC Area, 2nd Floor Front Mezzanine, Office	Door	Wood	White	Intact	– 0.5	Negative
	79	Interior	AFAC Area, 2nd Floor Front Mezzanine, Office	Door Casing	Metal	White	Intact	– 0.4	Negative
	80	Interior	AFAC Area, 2nd Floor Front Mezzanine, Office	Crown Molding	Wood	White	Intact	– 0.2	Negative
	81	Interior	AFAC Area, 2nd Floor Front Mezzanine, Office	Chair Rail	Wood	White	Intact	– 0.1	Negative
	82	Interior	AFAC Area, 2nd Floor Front Mezzanine, Office	Baseboard	Wood	White	Intact	0.2	Negative
	83	Interior	AFAC Area, 2nd Floor Front Mezzanine, Office	Windowsill	Metal	Gray	Intact	– 0.0	Negative
	84	Interior	AFAC Area, 2nd Floor Front Mezzanine, Work Area	Column	Drywall	White	Intact	– 0.2	Negative
	85	Interior	AFAC Area, 2nd Floor Front Mezzanine, Office	Door	Metal	Black	Intact	– 0.2	Negative
	86	Interior	AFAC Area, 2nd Floor Front Mezzanine, Office	Door Casing	Metal	Black	Intact	– 0.3	Negative
	87	Interior	AFAC Area, 2nd Floor Front Mezzanine, Office	Windowsill	Wood	White	Intact	– 0.2	Negative
	88	Interior	Inner Ear Studio, Entrance Area	Wall	Drywall	White	Intact	– 0.2	Negative
	89	Interior	Inner Ear Studio, Entrance Area	Door	Metal	Yellow	Intact	– 0.0	Negative

Reading Date	Reading Number	Interior/ Exterior	Room ID	Structure	Substrate	Color	Paint Condition[A]	Reading (mg/cm^2)[B]	Result[C]
	90	Interior	Inner Ear Studio, Entrance Area	Door Casing	Metal	Yellow	Intact	– 0.0	Negative
	91	Interior	Inner Ear Studio, Entrance Area	Closet Door	Wood	White	Intact	– 0.4	Negative
	92	Interior	Inner Ear Studio, Entrance Area	Closet Door Casing	Wood	White	Intact	– 0.2	Negative
	93	Interior	Inner Ear Studio, Restroom	Door Casing	Metal	Yellow	Intact	– 0.1	Negative
	94	Interior	Inner Ear Studio, Restroom	Wall	Drywall	White	Intact	– 0.5	Negative
	95	Interior	Inner Ear Studio, Restroom	Window Casing	Metal	White	Intact	– 0.3	Negative
	96	Interior	Inner Ear Studio, Corridor	Colum	Metal	Black	Intact	– 0.8	Negative
	97	Interior	Inner Ear Studio, Corridor	Wall	Drywall	Light Blue	Intact	– 0.1	Negative
	98	Interior	Inner Ear Studio, Inner Restroom	Wall	Drywall	Brown	Intact	– 0.3	Negative
	99	Interior	Inner Ear Studio, Inner Restroom	Door Casing	Metal	Brown	Intact	0.2	Negative
	100	Interior	Inner Ear Studio, Recording Studio	Duct	Metal	White	Intact	– 0.4	Negative
	101	Interior	Inner Ear Studio, Recording Studio	Ceiling	Concrete	White	Intact	– 0.4	Negative
	102	Interior	Inner Ear Studio, Recording Studio	Wall	Drywall	Tan	Intact	– 0.4	Negative
	103	Interior	Inner Ear Studio, Recording Studio 2	Wall	Drywall	White	Intact	– 0.2	Negative
	104	Interior	Inner Ear Studio, Recording Studio 2	Column	Metal	Gray	Intact	– 0.4	Negative
	105	Interior	Inner Ear Studio, Closet	Door Casing	Wood	White	Intact	– 0.0	Negative
	106	Interior	Inner Ear Studio, Recording Studio 3	Wall	Drywall	Blue	Intact	– 0.3	Negative
	107	Interior	Inner Ear Studio, Recording Studio 3	Wall	Drywall	Tan	Intact	– 0.4	Negative
	108	Interior	Ben and Jerry's Entrance Area	Wall	Drywall	White	Intact	– 0.3	Negative
	109	Interior	Ben and Jerry's Entrance Area	Floor	Concrete	Cream	Intact	– 0.4	Negative
	110	Interior	Ben and Jerry's Entrance Area	Ceiling	Concrete	White	Intact	– 0.6	Negative
	111	Interior	Ben and Jerry's Entrance Area	Door	Wood	White	Intact	– 0.3	Negative
	112	Interior	Ben and Jerry's Entrance Area	Door Casing	Wood	White	Intact	– 0.0	Negative
	113	Interior	Ben and Jerry's Entrance Area	Window Casing	Wood	White	Intact	0.1	Negative
	114	Interior	Ben and Jerry's Office space	Door	Metal	Gray	Intact	– 0.2	Negative
	115	Interior	Ben and Jerry's Office space	Door Casing	Metal	Gray	Intact	– 0.1	Negative
	116	Interior	Ben and Jerry's Office space	Column	Metal	White	Intact	– 0.4	Negative
	117	Exterior	Near Ben and Jerry's	Wall	Brick	Gray	Intact	– 0.2	Negative

Reading Date	Reading Number	Interior/ Exterior	Room ID	Structure	Substrate	Color	Paint Condition[(A)]	Reading (mg/cm^2)[(B)]	Result[(C)]
	118	Exterior	At Ben and Jerry's	Window casing	Wood	White	Intact	– 0.1	Negative
	119	Exterior	At Inner Ear Studio	Wall	CMU	Gray	Intact	– 0.5	Negative
	120	Exterior	At Inner Ear Studio	Window Casing	Metal	Gray	Intact	– 0.4	Negative
	121	Exterior	At Inner Ear Studio	Window Lintel	Metal	Gray	Intact	– 0.1	Negative
	122	Exterior	At Inner Ear Studio	Wall	Brick	Gray	Intact	– 0.4	Negative
	123	Exterior	At Inner Ear Studio	Door Lintel	Metal	Gray	Intact	– 0.3	Negative
	124	Exterior	At Inner Ear Studio, side	Door Lintel	Metal	Gray	Intact	– 0.5	Negative
	125	Exterior	Exterior Side Door	Door	Metal	Gray	Intact	– 0.4	Negative
	126	Exterior	Exterior Side Door	Door Casing	Metal	Gray	Intact	– 0.0	Negative
	127	Exterior	Exterior Side Door Portico	Ceiling	Wood	Gray	Intact	– 0.3	Negative
	128	Exterior	Front Entrance	Door	Wood	Maroon	Intact	– 0.2	Negative
	129	Exterior	Front Entrance	Door Casing	Wood	White	Intact	– 0.1	Negative
	130		Calibration					0.8	Average of 0.8
	131		Calibration					0.9	
	132		Calibration					0.8	

Notes:

(A) = Paint Condition: Intact (no damage); Deteriorated (cracked and peeling)

(B) = XRF Lead Results

(C) = Readings shaded in yellow are positive, and are confirmed as lead containing paint because the concentrations exceed 1 mg/cm^2

Readings above 0.0 are negative and are not defined as lead containing paint but could present a hazardous condition if disturbed causing exposure to workers, according to OSHA regulations.

Difference between Average and Calibration Block at Entry – 0.1

Difference between Average and Calibration Block at Exit – 0.1

APPENDIX D – INSPECTOR AND LABORATORY CERTIFICATIONS

COMMONWEALTH of VIRGINIA

Department of Professional and Occupational Regulation
9960 Mayland Drive, Suite 400, Richmond, VA 23233
Telephone: (804) 367-8500

EXPIRES ON
03-31-2022

NUMBER
3303004514

BOARD FOR ASBESTOS, LEAD, AND HOME INSPECTORS
ASBESTOS INSPECTOR LICENSE

NANDKISHORE KAUSHIK
13130 PEACH LEAF PLACE
FAIRFAX, VA 22030

DPOR

Mary Broz-Vaughan, Director

Status can be verified at http://www.dpor.virginia.gov

(SEE REVERSE SIDE FOR PRIVILEGES AND INSTRUCTIONS)

DPOR-LIC (02/2017)

(DETACH HERE)

DPOR COMMONWEALTH of VIRGINIA
Department of Professional and Occupational Regulation

BOARD FOR ASBESTOS, LEAD, AND HOME INSPECTORS
ASBESTOS INSPECTOR LICENSE
NUMBER: 3303004514 EXPIRES: 03-31-2022

NANDKISHORE KAUSHIK
13130 PEACH LEAF PLACE
FAIRFAX, VA 22030

(FOLD)

Status can be verified at http://www.dpor.virginia.gov

DPOR-PC (02/2017)

COMMONWEALTH of VIRGINIA

Department of Professional and Occupational Regulation
9960 Mayland Drive, Suite 400, Richmond, VA 23233
Telephone: (804) 367-8500

EXPIRES ON
12-31-2021

NUMBER
3303003902

BOARD FOR ASBESTOS, LEAD, AND HOME INSPECTORS
ASBESTOS INSPECTOR LICENSE

MICHEAL DAMIEN ALLSHOUSE
2009 RAWLINGS STREET
RICHMOND, VA 23231

DPOR

Mary Broz-Vaughan, Director

Status can be verified at http://www.dpor.virginia.gov

(SEE REVERSE SIDE FOR PRIVILEGES AND INSTRUCTIONS)

DPOR-LIC (02/2017)

COMMONWEALTH of VIRGINIA

Department of Professional and Occupational Regulation
9960 Mayland Drive, Suite 400, Richmond, VA 23233
Telephone: (804) 367-8500

EXPIRES ON
08-31-2021

NUMBER
3356001040

BOARD FOR ASBESTOS, LEAD, AND HOME INSPECTORS
LEAD RISK ASSESSOR LICENSE

MICHEAL DAMIEN ALLSHOUSE
2009 RAWLINGS STREET
RICHMOND, VA 23231

DPOR

Mary Broz-Vaughan, Director

Status can be verified at http://www.dpor.virginia.gov

(SEE REVERSE SIDE FOR PRIVILEGES AND INSTRUCTIONS)

DPOR-LIC (02/2017)

AIHA Laboratory Accreditation Programs, LLC

acknowledges that

Aerobiology Laboratory Associates, Inc.

43760 Trade Center Place, Suite 100, Dulles, VA 20166

Laboratory ID: 102977

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC accreditation to the ISO/IEC 17025:2017 international standard, *General Requirements for the Competence of Testing and Calibration Laboratories* in the following:

LABORATORY ACCREDITATION PROGRAMS

☐	**INDUSTRIAL HYGIENE**	Accreditation Expires:
☐	**ENVIRONMENTAL LEAD**	Accreditation Expires:
✓	**ENVIRONMENTAL MICROBIOLOGY**	Accreditation Expires: March 01, 2021
☐	**FOOD**	Accreditation Expires:
☐	**UNIQUE SCOPES**	Accreditation Expires:

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached **Scope of Accreditation**. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2017 and AIHA-LAP, LLC requirements. This certificate is not valid without the attached **Scope of Accreditation**. Please review the AIHA-LAP, LLC website (www.aihaaccreditedlabs.org) for the most current Scope.

Elizabeth Bair
Chairperson, Analytical Accreditation Board

Cheryl O. Morton
Managing Director, AIHA Laboratory Accreditation Programs, LLC

Revision 17 – 09/11/2018

Date Issued: 03/01/2019

AIHA Laboratory Accreditation Programs, LLC
SCOPE OF ACCREDITATION

Aerobiology Laboratory Associates, Inc.
43760 Trade Center Place, Suite 100, Dulles, VA 20166

Laboratory ID: **102977**
Issue Date: 02/28/2019

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

Environmental Microbiology Laboratory Accreditation Program (EMLAP)

Initial Accreditation Date: 10/01/2002

EMLAP Category	Field of Testing (FoT)	Method	Method Description (*for internal methods only*)
Fungal	Air - Culturable	SOP 3.2	In-house: Analysis of Culturable Air Samples for Fungi
	Bulk - Culturable	SOP 3.4	In-house: Analysis of Culturable Bulk Samples for Fungi
	Surface - Culturable	SOP 3.3	In-house: Analysis of Culturable Surface Samples for Fungi
	Air - Direct Examination	SOP 3.8	In-house: Analysis of Spore Trap
	Bulk - Direct Examination	SOP 3.7	In-house: Bulk Direct Analysis
	Surface - Direct Examination	SOP 3.7	In-house: Surface Direct Analysis
Bacterial	Air - Culturable	SOP 2.2	In-house: Analysis of Culturable Air Samples for Bacterial
	Bulk - Culturable	SOP 2.4	In-house: Analysis of Culturable Bulk Samples for Bacterial
	Surface - Culturable	SOP 2.3	In-house: Analysis of Culturable Surface Samples for Bacterial
	Legionella	SOP 2.22	CDC 2005 Procedures for the Recovery of Legionella from the Environment
		SOP 2.35	CDC 2005 Procedures for the Recovery of Legionella from the Environment

A complete listing of currently accredited Environmental Microbiology laboratories is available on the AIHA-LAP, LLC website at: http://www.aihaaccreditedlabs.org

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 200829-0

Aerobiology Laboratory Associates, Inc.

Dulles, VA

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Asbestos Fiber Analysis

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2020-04-01 through 2021-03-31

Effective Dates

For the National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

Aerobiology Laboratory Associates, Inc.
43760 Trade Center Place
Suite 100
Dulles, VA 20166-2119
Ms. Sun Bun Bowling
Phone: 703-648-9150 Fax: 703-648-3919
Email: sunbun@aerobiology.net
http://www.aerobiology.net

ASBESTOS FIBER ANALYSIS — NVLAP LAB CODE 200829-0

Bulk Asbestos Analysis

Code	*Description*
18/A01	EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples
18/A03	EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

For the National Voluntary Laboratory Accreditation Program

APPENDIX E – PHOTOGRAPHIC LOG OF ASBESTOS, LBP & HAZARDOUS MATERIALS SAMPLES

PHOTOGRAPHIC LOG

Homogeneous Material No. 1 – Non-ACM White Drywall with White Joint Compound located throughout the Subject Property

Homogeneous Material No. 2 – Non-ACM Grey Caulk located at the Interior Door in the 2nd Floor Front Mezzanine Area

Homogeneous Material No. 3 – Non-ACM 2'X4' White Textured Lay-in Ceiling Tile (dots with dashes design), located in all of 1st floor and 2nd floor front Mezzanine Plus part of back Mezzanine Area

Homogeneous Material No. 4 – Non-ACM Grey 4" Vinyl Cove Base with Cream and Yellow Mastic located throughout 1st Floor and 2nd floor front Mezzanine Area

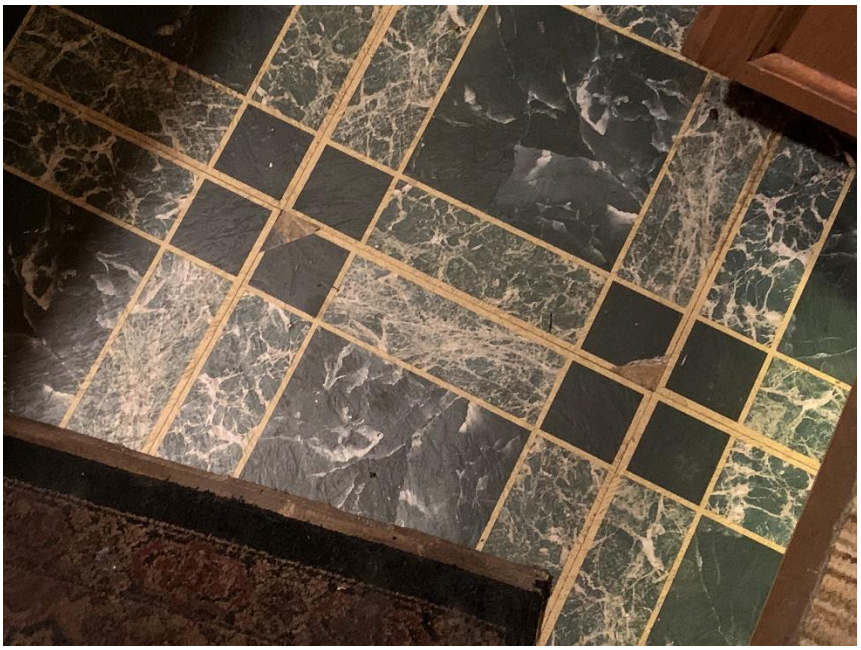
Homogeneous Material No. 5 – Non-ACM Grey 12” X 12” Vinyl Floor Tile with Light Yellow Mastic located throughout 1st Floor and Restrooms in 2nd floor front Mezzanine Area

Homogeneous Material No. 6 – Non-ACM White Dry Wall with White Joint Compound located throughout Ben and Jerry Area

Homogeneous Material No. 7 – Non-ACM Black 4” Vinyl Cove Base with Light Yellow Mastic located throughout Ben and Jerry Area

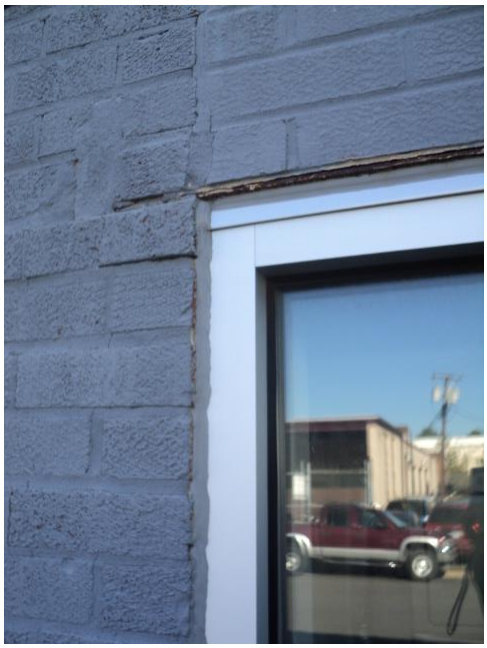
Homogeneous Material No. 8 – Non-ACM White Dry Wall with White Joint Compound located throughout Inner Studio Area

Homogeneous Material No. 9 – Non-ACM Black 4” Vinyl Cove Base with Tan Mastic located throughout Inner Studio Area



Homogeneous Material No. 10 – Non-ACM Green Geometric Pattern Peel & Stick 12” X 12” Vinyl Floor Tile with Yellow Mastic located in Kitchen area of Inner Ear Studio

Homogeneous Material No. 11 – ACM Black Sink Bowl Mastic Coating located in Kitchen of the Inner Ear Studio



Homogeneous Material No. 12 – Non-ACM Grey Exterior Door Caulk located in Ben & Jerry area

Homogeneous Material No. 13 – Non-ACM Grey Exterior Door caulk located outside the Inner Ear Studio

Homogeneous Material No. 14 – Non-ACM White Exterior Window Caulk located outside the Inner Ear Studio

Homogeneous Material No. 15 – ACM White/Off-White exterior Window glazing compound located in the Exterior Metal Window of Inner Ear Studio

Homogeneous Material No. 16 – Non-ACM Grey Wall Expansion Joint Caulk located in the Exterior Wall of Building

Homogeneous Material No. 17 – Non-ACM Black flashing caulk located on the Lower Roof of the Building

Homogeneous Material No. 18 – Non-ACM Black asphalt Sheet Roofing located on the upper Roof of the Building

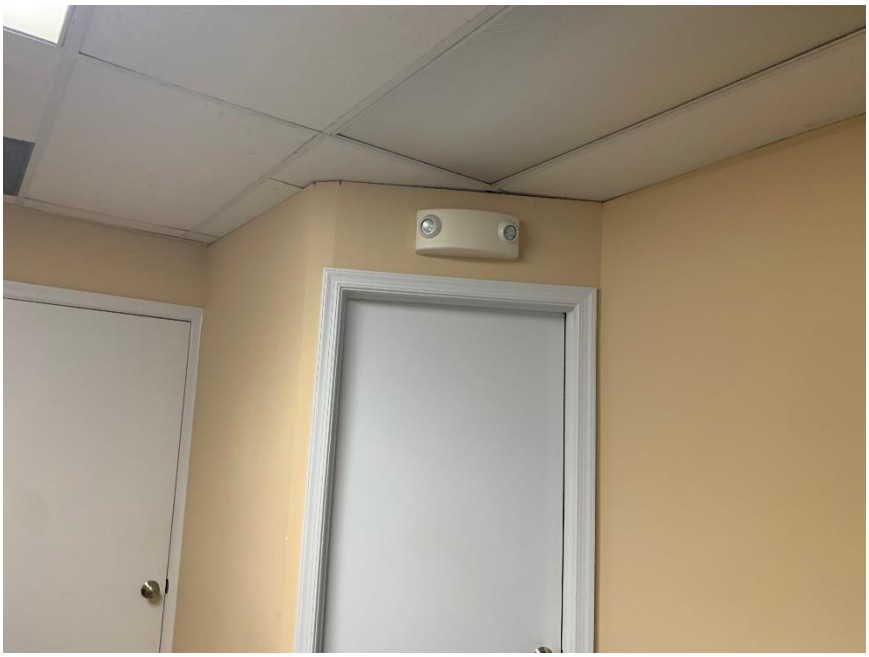
Homogeneous Material No. 19 – Non-ACM Grey Caulk – White/Grey Parapet wall Cap Caulk located on the Upper Roof of the Building

Homogeneous Material No. 20 – Non-ACM Grey Mastic – Grey HVAC Duct Mastic located on the Lower Roof of the Building

Homogeneous Material No. 21 – Non-ACM 2’ X 2’ White textured pinhole Lay-in Ceiling Tile located in Portion of the 2nd Floor Mezzanine Area in the Back

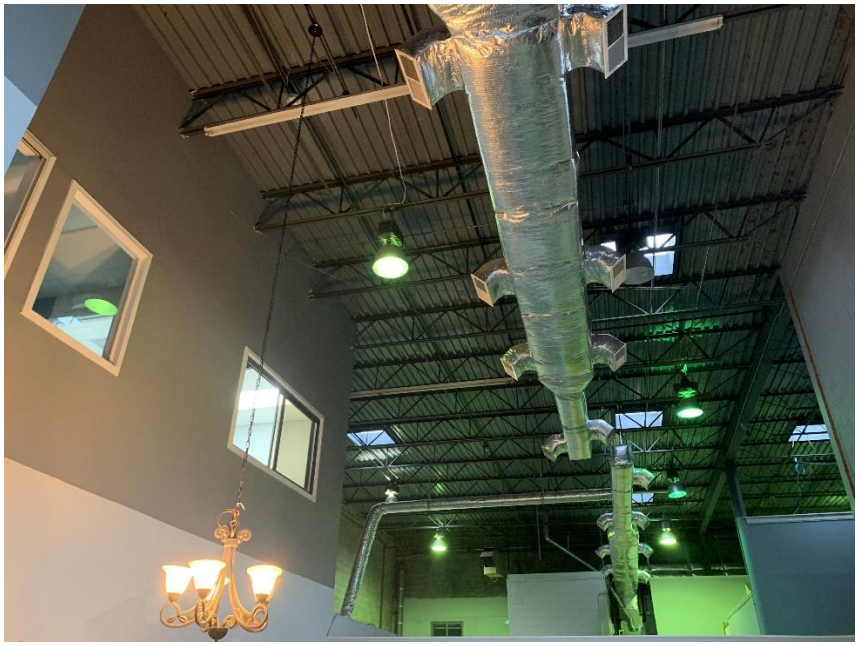
PHOTOGRAPHIC LOG
(Other Hazardous Materials)

Lighted Exit Sign near the Front Entrance of the Arlington Count Food Assistance Center

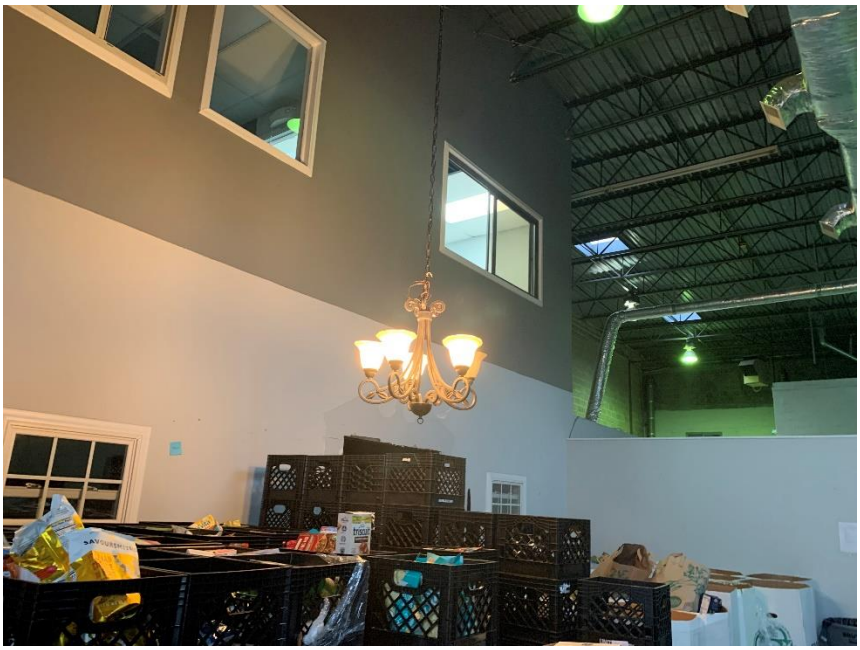


Typical Emergency Lighting at the Arlington Count Food Assistance Center

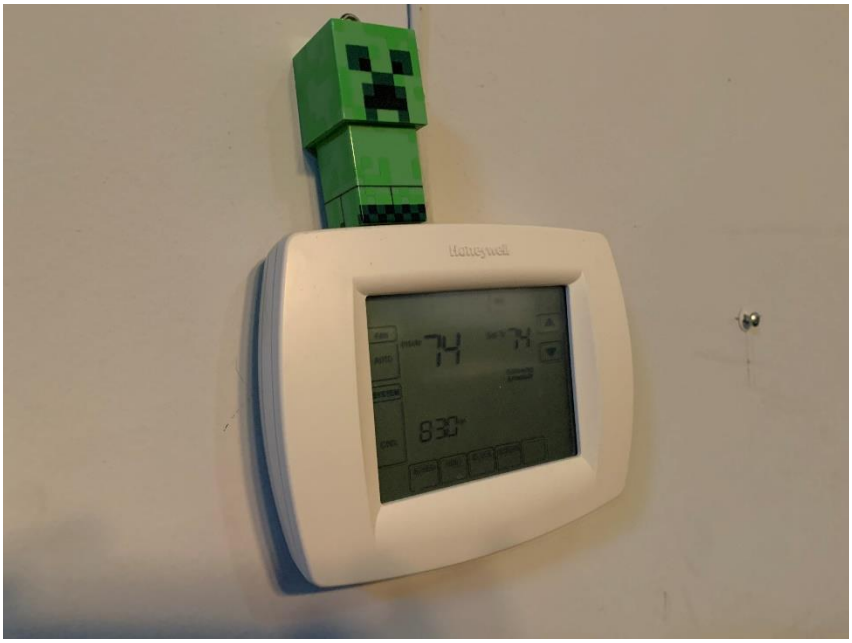
Typical fluorescent Lighting at the Subject Property



Typical Ceiling-Mounted Lighting Fixtures at the Subject Property



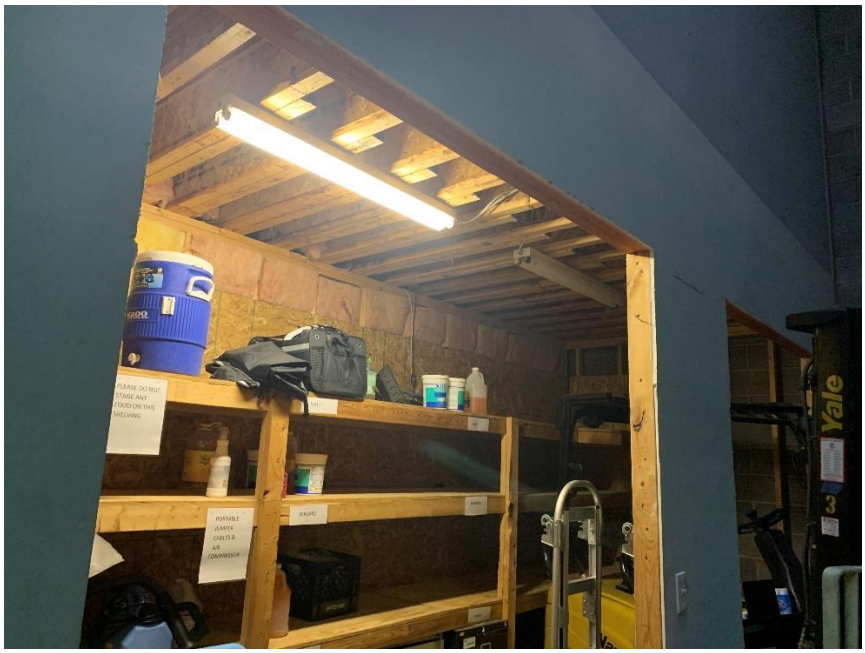
Typical fluorescent Bulb Lighting at the Subject Property



Digital Thermostat for interior climate control at the Subject Property

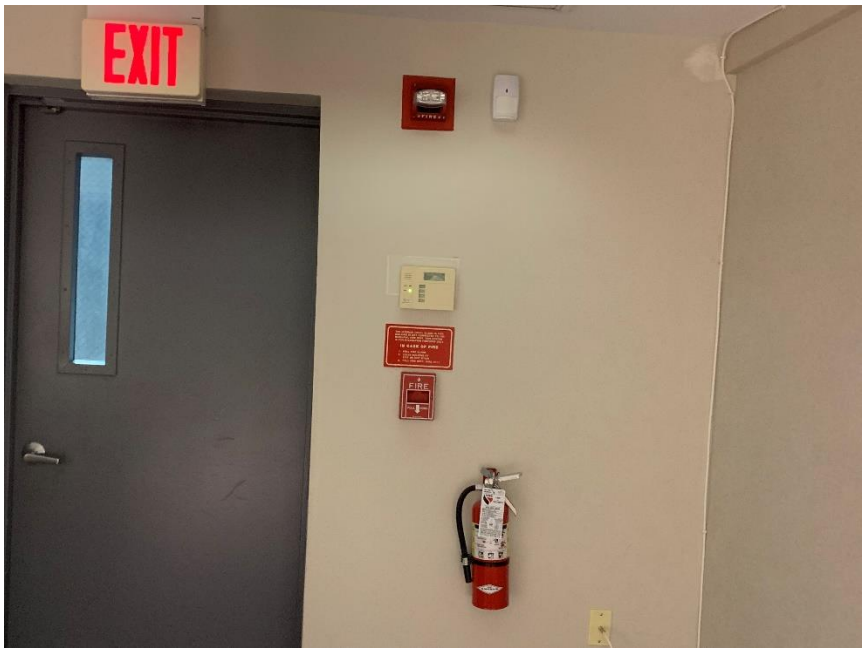
Typical Fire Extinguisher and Fire Alarm Pull-Down Station at the Subject Property

Typical Lighted Sign and Emergency Lighting Combination at the Subject Property



Typical Fluorescent Lighting in the Storage Area of the Arlington Food Assistance Center at the Subject Property

Fire Extinguisher in the Storage Areas of the Subject Property



Fire Extinguisher, Pull-Down Station, Fire Strobe, Alarm System Control Panel and Motion Detector at the Subject Property

Recessed Fluorescent Lighting in the office Space of the 2nd Floor Front Mezzanine Area of the Subject Property

Different Type of Emergency Lighting at the Subject Property