GRIMM AND PARKER

PROJECT MANUAL

FOR

1425 UPGRADE

1425 NORTH QUINCY STREET, ARLINGTON, VIRGINIA

ARLINGTON COUNTY VIRGINIA

ARLINGTON
VIRGINIA

BID SET

PHASE 1

February 20, 2020

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SECTION 01 10 00 - SUMMARY

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:
   1. Project information.
   2. Work covered by Contract Documents.
   3. Access to site.
   4. Work restrictions.
   5. Specification and Drawing conventions.
   6. Miscellaneous provisions.

B. Related Requirements:
   1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

C. Common Definitions Used in the Specification:
   1. Owner - Arlington County and its various sub entities.
   2. Architect - Designer of Record hired by the County as a consultant.
   3. Engineer - Designer of Record hired by the county or by a consultant or contractor under contract with the County
   4. Project Manager - Arlington Count Project Officer.
   5. Construction Manager - Consultant hired by the County to assist the Project Officer.
   6. Contractor - General Contractor hired by the County to construct the project or subcontractor under contract to the General Contractor.

1.3 PROJECT INFORMATION

A. Project Identification: 1425 N. Quincy Street.

B. Owner: Arlington County Government
   1. Owner's Representative:
      a. Facilities Management Bureau

C. Architect: Grimm + Parker Architects

D. Architect's Consultants: Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:

E. Contractor: “To be determined” has been engaged as Contractor for this Project.

F. Web-Based Project Software: Project software directed by Owner must be used for purposes of managing communication and documents during the construction stage.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:
   1. Existing building upgrades indicated with the Contract Documents.
   2. Construction of two new vehicle access ramps and overhead doors allowing access and storage of miscellaneous county vehicles.
   3. Interior renovation to meet ADA compliance and life safety.

B. Type of Contract:
   1. Project will be constructed under a single prime contract.

1.5 PROJECT TEAM BUILDING EXERCISE

A. Within 21 days after the Notice to Proceed, the Contractor shall sponsor a team building workshop, held onsite and chaired by an independent facilitator experienced in construction project team building. Participants shall include Contractor's key Project, Contractor's project executive, the Architect and County staff. The workshop shall be a minimum of four hours' duration.

1.6 CONSTRUCTION PERMITS

A. The County will obtain and pay fees for the Building Construction Permit and Certificate of Occupancy. The Contractor shall be solely responsible for thoroughly understanding, obtaining, and paying for all other permits requirement as it pertains to work under this Contract. All Permits obtained by The County are the responsibility of the Contractor to track and monitor for renewal. The Contractor will notify the County at least 30 days prior to the permit expiration date.

B. Permits required for the project may include some or all of the following, but are not limited to:
   1. County Land Disturbing Activities (LDA) permit
   2. County Public Right-Of-Way (PROW) permit
   3. County Transportation Right-Of-Way(TROW) permit
   4. County Department of Environmental Services (DES) permits
   5. VDOT Land Use Permit
   6. VDOT Open Cut Permit

C. All fees for County DES permits will be paid and acquired by the Contractor.

D. The Contractor is responsible for obtaining the County LDA permit, VDOT Land Use and Open Cut permits will be obtained by the County prior to the start of Work. The Contractor shall complete and sign both the VDOT LUP-E&S and LUP-WZTC forms and submit to the County Project Officer for submission to VDOT prior to the start of Work.

E. The Contractor is responsible for obtaining an Arlington County PROW and TROW permits for any work within the Arlington County Right-Of-Way. The Contractor is responsible for obtaining all other required permits not obtained by the County. The Contractor is responsible for investigating and satisfying all County and VDOT Permit requirements.

F. The Contractor shall provide a Responsible Land Disturber (RLD) that meets all the required qualifications of the permits. The Contractor shall complete and sign the RLD certificate and submit to the County Project Officer prior to the start of Work

G. Any activities requiring welding or soldering shall require a Permit from Arlington County. The permit shall include time frame for welding or soldering, certification of welder and method of odor and/or smoke mitigation. The permit shall be submitted for work no greater than 5 days in duration and shall be submitted a 3 day in advance of the associated work. The contractor shall receive written authorization for the permit from Arlington County prior to initiating work requiring the permit.

H. The Contractor shall be responsible for scheduling and coordinating inspections and receipts of local or state permits/approvals/certifications for any tanks, piping and associated appurtenances, which are constructed, installed tested or removed as part of this contract.

1.7 INSPECTIONS

A. It is the contractor's responsibility to schedule all required inspections with either of the appropriate parties (ISD, DES, Inspection Agency, VDOT, etc.…).

B. The contractor is required to fully understand the County inspection process and is responsible for researching and obtaining all required permits and or non-permit reviews as identified by Arlington County Government. See www.arlingtonva.us for applicable requirements.

1.8 ACCESS TO SITE

A. The Contractor's use of the premises is limited by the Owner's right to perform construction operations with its own forces or to employ separate contractors on portions of the project.

B. Staging: The staging area will be confined to the staging area defined and established with the County. No material will be staged on the sidewalks, other areas around the other buildings. The contractor must visit the site prior to bid to familiarize himself with the existing conditions and staging area. The contractor is responsible for coordinating, furnishing and implementing any Maintenance of Traffic (MOT) required for staging operations.

C. Photography: Contractor shall maintain a photographic record of the project both with monthly overall progress photos and repair specific photos. This is to include photos taken pre-construction, pre-repair (post cleaning and prep), and post repair. Submit repair photos with monthly progress photos along with monthly request for payment.

D. The contractor shall be aware that limited ceiling heights exist throughout the building.

E. The Contractor shall assume full responsibility for materials and equipment stored on-site.

1.9 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.
   1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise coordinated. It is understood and expected to have early morning, night and weekend work to complete this work.
   1. Weekend Hours: Permitted between 7:00 am and 5:00 pm on weekends and County holidays, when approved in writing 24 hours prior to any activity start by the County Project Officer.
   2. Early Morning Hours: Permitted with approval of the County Project Officer.
   3. Hours for Utility Shutdowns: After normal business hours.
   4. Hours for Core Drilling: After normal business hours.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
   1. Notify County Project Officer not less than two days in advance of proposed utility interruptions.
   2. Obtain County Project Officer's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in medium to high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
   1. Notify Owner not less than two days in advance of proposed disruptive operations.
   2. Obtain Owner's written permission before proceeding with disruptive operations.

3. Provide coordination schedule that indicates proposed dates for the activities that fall under the above criteria.

E. Restricted Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
1. Maintain list of approved screened personnel with Owner's representative.

H. Construction/ Contractor/ Subcontractor Parking
1. There will be designated on-site parking spaces allowed for vehicles belonging to the Contractor and their sub-Contractors.
2. No on-site parking will be allowed. All parking for construction will be provided by the contractor at its expense offsite.

I. Delivery of Building Material and Removal of Trash
1. The Contractor shall not obstruct the main entry to the site and roadways and/or roadways inside the site at any time for the delivery of building materials and the removal of all refuse, rubbish, scrap materials and debris. The Contractor shall use designated areas for loading, delivery and removal of debris/trash. Coordinate any materials or containers leaving the site with security

J. BACNET
1. All equipment shall be compatible and able to communicate with Arlington Counties BAS (Bacnet). Any questions regarding Bacnet should be asked during the pre-bid RFI period.

1.10 SPECIFICATION AND DRAWING CONVENTIONS

A. It is the contractor’s responsibility to review and understand drawings and specifications. Any discrepancies or issues shall be addressed via an RFI prior to bid day. Any discrepancies brought up after bid day are subject to non-payment by the County and the greater condition shall be assumed as included in the contract sum.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.

3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.11 CONSTRUCTON STANDARDS

A. All work shall conform to project plans, specifications and supplementary specifications along with the current edition of following County and State Construction Standards, as applicable:
   1. The Arlington County Department of Environmental Services (DES) Construction Standards and Specifications, a copy of which may be downloaded at no charge from the internet at:
      a. http://arlingtonva.s3.amazonaws.com/wp-content/uploads/sites/21/2013/12/Construction-Specifications-9-30-13.pdf
   2. The Arlington County Department of Environmental Services (DES) Traffic Signal & Streetlight Specifications, a copy of which may be downloaded at no charge from the internet at:
      a. http://arlingtonva.s3.amazonaws.com/wp-content/uploads/sites/21/2013/12/Traffic-Signal-and-Street-Light-Specifications.pdf
   3. The Arlington County Department of Environmental Services (DES) Streetlight Specifications, a copy of which may be downloaded at no charge from the internet at: https://transportation.arlingtonva.us/streets/street-lights/lighting-standards-specifications-updates/
   4. The Arlington County Department of Environmental Services (DES) Pavement Marking Specifications, a copy of which may be downloaded at no charge from the internet at:
      a. http://transportation.arlingtonva.us/streets/traffic-signals/
   5. The Arlington County Department of Parks and Recreation (DPR) Specifications, a copy of which may be downloaded at no charge from the internet at:
      a. http://parks.arlingtonva.us/design-standards/
   6. The Arlington County Department of Environmental Services (DES) Dichlorination and Disposal Procedures, a copy of which may be downloaded at no charge from the internet at:
      a. http://topics.arlingtonva.us/building/discharging-chlorinated-water/
   7. The Virginia Department of Transportation (VDOT) Road and Bridge Standards and Specifications, a copy of which may be downloaded at no charge from the internet at: http://www.virginiadot.org/business/locdes/Standards_TOC.asp
      a. and http://www.virginiadot.org/business/const/spec-default.asp
   8. The Virginia Department of Transportation (VDOT) - • The Virginia Work Area Protection Manual (WAPM) found on the internet at:
      a. http://www.virginiadot.org/business/trafficeng-WZS.asp
   9. Manual on Uniform Traffic Control Devices(MUTCD), a copy of which may be downloaded at no charge from the internet at: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/pdf_index.htm
   10. The Virginia Department of Transportation (VDOT) - Supplement to the MUTCD found on the internet at:
      a. http://www.virginiadot.org/business/virginia_mutcd_supplement.asp

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01 25 00 - SUBSTITUTION 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 substitutions.

B. Related Requirements:
   1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
   1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
   2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. Submit 3 copies of each request for substitution for consideration. Submit requests in the form and in accordance with procedures required for Change Order proposals
   2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
      a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
      b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
      c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
      d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
      e. Samples, where applicable or requested.
      f. Certificates and qualification data, where applicable or requested.
      g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.

h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.7 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
a. Requested substitution is consistent with the Contract Documents and will produce indicated results and revisions to Contract Documents are not required.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.

e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
i. The request is timely, fully documented and properly submitted. The specified product or method of construction can 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.
j. 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 A/E for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.

B. Substitutions for Convenience: Not allowed.

1.8 PRODUCTS (Not Used)

1.9 EXECUTION (Not Used)

END OF SECTION

SECTION 01 26 00 - 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.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue through the Owner supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: The Owner 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 the Owner are not instructions either to stop work in progress or to execute the proposed change.
   2. Within time specified in Proposal Request or 14 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
      a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
      b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
      c. Include costs of labor and supervision directly attributable to the change.
      d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
      e. Quotation Form: Use forms acceptable to Architect.

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 the Owner.
   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 acceptable to Architect.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, Owner will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. 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.

1.7 P2 PRODUCTS (Not Used)

1.8 P3 EXECUTION (Not Used)

END OF SECTION

SECTION 01 29 00 - PAYMENT 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 necessary to prepare and process Applications for Payment.

B. Related Requirements:
   1. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
   2. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule. Cost-loaded Critical Path Method Schedule may serve to satisfy requirements for the schedule of values.
   1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
   2. Submit the schedule of values to the Project Officer or his representative at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
   3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
   4. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
   5. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract, as described in Section 011000 "Summary."

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one-line item for each Specification Section.
   1. Identification: Include the following Project identification on the schedule of values:
      a. Project name and location.
      b. Name of Architect.
      c. Architect's Project number.
      d. Contractor's name and address.

e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.
3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:
   a. Related Specification Section or Division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
      1) Labor.
      2) Materials.
      3) Equipment.
4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
   a. Differentiate between items stored on-site and items stored off-site.
6. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate Owner payments or deposits, if any, and balance to be paid by Contractor.
7. Overhead Costs: Include total cost and proportionate share of general overhead and profit for each line item.
8. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
9. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by the Project Officer or designated representative and paid for by Owner.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. The Project Officer or designated representative will return incomplete applications without action.
   1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.

2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:
   a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
   b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
   c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Products list (preliminary if not final).
5. Sustainable design action plans, including preliminary project materials cost data.
6. Schedule of unit prices.
7. Submittal schedule (preliminary if not final).

8. List of Contractor's staff assignments.
9. List of Contractor's principal consultants.
10. Copies of building permits.
11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
12. Initial progress report.
13. Report of preconstruction conference.

I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
   1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
   2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
   1. Evidence of completion of Project closeout requirements.
   2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
   3. Updated final statement, accounting for final changes to the Contract Sum.
   4. AIA Document G706.
   5. AIA Document G706A.
   6. Evidence that claims have been settled.
   7. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
   8. Final liquidated damages settlement statement.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 31 00 - 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. Coordination drawings.
   3. RFIs.
   4. Digital project management procedures.
   5. Project meetings.

B. Related Requirements:
   1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
   2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
   3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.
   4. Section 019113 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

1.3 DEFINITIONS

A. BIM: Building Information Modeling.

B. RFI: Request for Information. Request from Owner, Construction Manager, 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 15 days of starting construction operations, 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 and 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, in web-based Project software directory, and in prominent location in each built facility. Keep 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.
   4. The General Contractor shall cooperate with and coordinate work required to be performed by the Owner’s independent subcontractors.

B. 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. Installation and removal of temporary facilities and controls.
   4. Delivery and processing of submittals.
   5. Progress meetings.
   6. Preinstallation conferences.
   7. Project closeout activities.
   8. Startup and adjustment of systems.

B. General Contractor Project Management Team: General Contractor cannot replace the Project Manager and Superintendent assigned to the Project, unless those individual leave the employment of the General Contractor.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
   1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
      a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
      b. Coordinate the addition of trade-specific information to coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
      c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
      d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.

e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
f. Indicate required installation sequences.
g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling, raised access floor, and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
   a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
   b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
   c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
   a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
   b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
   c. Panel board, switch board, switchgear, transformer, busway, generator, and motor-control center locations.
   d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Show the following:
   a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
9. Review: Architect will review coordination drawings to confirm that in general the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."

C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
2. File Submittal Format: Submit or post coordination drawing files using PDF format.
3. BIM File Incorporation: Develop and incorporate coordination drawing files into BIM established for Project.
    a. Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
4. Architect may furnish Contractor one limited set of digital data files of Drawings for use in preparing coordination digital data files at the direction of the Owner.
    a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
    b. Digital Data Software Program: Drawings are available in Autocad 2017.
    c. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.

1.7 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. The Project Officer will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
    2. Coordinate and submit RFIs in a prompt manner so as 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. Project number.
    3. Date.
    4. Name of Contractor.
    5. Name of Architect.
    6. RFI number, numbered sequentially.
    7. RFI subject.
    8. Specification Section number and title and related paragraphs, as appropriate.
    9. Drawing number and detail references, as appropriate.
    10. Field dimensions and conditions, as appropriate.
    11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
    12. Contractor's signature.
    13. 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: AIA Document G716 or 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 working 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 Architectof 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 10 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 submitted at each coordination bi-weekly coordination meeting. Use software log that is part of web-based Project software log with not less than 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 seven days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

A. Use of Architect's Digital Data Files: Digital data files of Architect's limited CAD drawings 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 Autocad 2017.
   4. Contractor shall execute a data licensing agreement in the form of AIA Document C106 Digital Data Licensing Agreement.
      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 AIA Document C106.

5. The following digital data files will be furnished for each appropriate discipline:
   a. Floor plans.
   b. Reflected ceiling plans.

B. Web-Based Project Software: The Project and all participants will use the web-based Project software directed by the County for purposes of hosting and managing Project communication and documentation until Final Completion.
   1. At completion of Project, provide digital archive in format that is readable by common desktop software applications. 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.

1.9 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 10 working 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: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than15 days after execution of the Agreement.
   1. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, 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. Critical work sequencing and long lead items.
      e. Designation of key personnel and their duties.
      f. Lines of communications.
      g. Use of web-based Project software.
      h. Procedures for processing field decisions and Change Orders.
      i. Procedures for RFIs.
      j. Procedures for testing and inspecting.
      k. Procedures for processing Applications for Payment.
      l. Distribution of the Contract Documents.
      m. Submittal procedures.

n. Sustainable design requirements.
o. Preparation of Record Documents.
p. Use of the premises and existing building.
q. Work restrictions.
r. Working hours.
s. Owner's occupancy requirements.
t. Responsibility for temporary facilities and controls.
u. Procedures for moisture and mold control.
v. Procedures for disruptions and shutdowns.
w. Construction waste management and recycling.
x. Parking availability.
y. Office, work, and storage areas.
z. Equipment deliveries and priorities.
aa. First aid.
ab. Security.
ac. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Sustainable Design Requirements Coordination Conference: Owner will schedule and conduct a sustainable design coordination conference before starting construction, at a time convenient to Owner Architect, and Contractor.
1. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, and their consultants; Contractor and its superintendent and sustainable design coordinator; 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 meeting sustainable design requirements, including the following:
a. Sustainable design Project checklist.
b. General requirements for sustainable design-related procurement and documentation.
c. Project closeout requirements and sustainable design certification procedures.
d. Role of sustainable design coordinator.
e. Construction waste management.
f. Construction operations and sustainable design requirements and restrictions.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

D. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, and Owner's Commissioning Authority of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
a. Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.

e. Purchases.
f. Deliveries.
g. Submittals.
h. Sustainable design requirements.
i. Review of mockups.
j. Possible conflicts.
k. Compatibility requirements.
l. Time schedules.
m. Weather limitations.
n. Manufacturer's written instructions.
o. Warranty requirements.
p. Compatibility of materials.
q. Acceptability of substrates.
r. Temporary facilities and controls.
s. Space and access limitations.
t. Regulations of authorities having jurisdiction.
u. Testing and inspecting requirements.
v. Installation procedures.
w. Coordination with other work.
x. Required performance results.
y. Protection of adjacent work.
z. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

E. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 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, Owner's Commissioning Authority, 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. Submittal of written warranties.
e. Requirements for completing sustainable design documentation.
f. Requirements for preparing operations and maintenance data.
g. Requirements for delivery of material samples, attic stock, and spare parts.
h. Requirements for demonstration and training.

i. Preparation of Contractor's punch list.
j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
k. Submittal procedures.
l. Owner's partial occupancy requirements.
m. Installation of Owner's furniture, fixtures, and equipment.
n. Responsibility for removing temporary facilities and controls.

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

F. Progress Meetings: Conduct progress meetings at biweekly intervals. Progress meeting frequency can be adjusted with the Project Officers approval.
1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner, Owner's Commissioning Authority 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) Resolution of BIM component conflicts.
4) Status of submittals.
5) Status of sustainable design documentation.
6) Deliveries.
7) Off-site fabrication.
8) Access.
9) Site use.
10) Temporary facilities and controls.
11) Progress cleaning.
12) Quality and work standards.
13) Status of correction of deficient items.
14) Field observations.
15) Status of RFIs.
16) Status of Proposal Requests.
17) Pending changes.
18) Status of Change Orders.
19) Pending claims and disputes.
20) Documentation of information for payment requests.

4. Minutes: The General Contractor shall be responsible for conducting the meeting, recording and distributing 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

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

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 documenting the progress of construction during performance of the Work, including the following:
   1. Startup construction schedule.
   2. Contractor's Construction Schedule.
   3. Construction schedule updating reports.
   4. Daily construction reports.
   5. Material location reports.
   6. Site condition reports.
   7. Unusual event reports.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
   1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
   2. Predecessor Activity: An activity that precedes another activity in the network.
   3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.
   1. Float time belongs to Owner.
   2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
   3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:
   1. Working electronic copy of schedule file, where indicated.

2. PDF file.
3. Two paper copies, of sufficient size to display entire period or schedule, as required.

B. Startup construction schedule.
1. Submittal of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.

E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
3. Total Float Report: List of activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.

F. Construction Schedule Updating Reports: Submit with Applications for Payment.

G. Daily Construction Reports: Submit at monthly intervals.

H. Material Location Reports: Submit at monthly intervals.

I. Site Condition Reports: Submit at time of discovery of differing conditions.

J. Unusual Event Reports: Submit at time of unusual event.

K. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:
1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing work stages area separations interim milestones and partial Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.

8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
   1. Secure time commitments for performing critical elements of the Work from entities involved.
   2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
   1. Use Software package acceptable to the Owner and Architect for current Windows operating system.

B. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.
   1. In-House Option: Owner may waive requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
   2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.

C. Time Frame: Extend schedule from date established for the Notice of Award to date of final completion.
   1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

D. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
   1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
   2. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
   3. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
   4. Commissioning Time: Include no fewer than 15 days for commissioning.
   5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
   6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

E. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
   1. Phasing: Arrange list of activities on schedule by phase.

2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
3. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
4. Work Restrictions: Show the effect of the following items on the schedule:
    a. Coordination with existing construction.
    b. Limitations of continued occupancies.
    c. Uninterruptible services.
    d. Partial occupancy before Substantial Completion.
    e. Use-of-premises restrictions.
    f. Provisions for future construction.
    g. Seasonal variations.
    h. Environmental control.
5. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    a. Subcontract awards.
    b. Submittals.
    c. Purchases.
    d. Mockups.
    e. Fabrication.
    f. Sample testing.
    g. Deliveries.
    h. Installation.
    i. Tests and inspections.
    j. Adjusting.
    k. Curing.
    l. Building flush-out.
    m. Startup and placement into final use and operation.
    n. Commissioning.
6. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
    a. Structural completion.
    b. Temporary enclosure and space conditioning.
    c. Permanent space enclosure.
    d. Completion of mechanical installation.
    e. Completion of electrical installation.
    f. Substantial Completion.

F. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion, and the following interim milestones:
1. Temporary enclosure and space conditioning.

G. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
1. See Section 012900 "Payment Procedures" for cost reporting and payment procedures.

H. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
   1. Unresolved issues.
   2. Unanswered Requests for Information.
   3. Rejected or unreturned submittals.
   4. Notations on returned submittals.
   5. Pending modifications affecting the Work and the Contract Time.

I. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
   1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
   2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
   3. As the Work progresses, indicate final completion percentage for each activity.

J. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.

K. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
   1. Post copies in Project meeting rooms and temporary field offices.
   2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.8 STARTUP CONSTRUCTION SCHEDULE

A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within seven days of date established for the Notice of Award.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

1.9 GANTT-CHART SCHEDULE REQUIREMENTS

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice of Award.
   1. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
   1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

1.10 CPM SCHEDULE REQUIREMENTS

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice of Award. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's Construction Schedule using a cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.
   1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 21 days after date established for commencement of the Work.
      a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.
   2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
   3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
   4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule to coordinate with the Contract Time.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
   1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
      a. Preparation and processing of submittals.
      b. Mobilization and demobilization.
      c. Purchase of materials.
      d. Delivery.
      e. Fabrication.
      f. Utility interruptions.
      g. Installation.
      h. Work by Owner that may affect or be affected by Contractor's activities.
      i. Testing and inspection.
      j. Commissioning.
      k. Punch list and final completion.
      l. Activities occurring following final completion.
   2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
   3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
   4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
      a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
   5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Architect's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals,

punch list activities, Project record documents, and demonstration and training (if applicable), in the amount of percent of the Contract Sum.
   a. Each activity cost shall reflect an appropriate value subject to approval by Architect.
   b. Total cost assigned to activities shall equal the total Contract Sum.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.

F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
   1. Contractor or subcontractor and the Work or activity.
   2. Description of activity.
   3. Main events of activity.
   4. Immediate preceding and succeeding activities.
   5. Early and late start dates.
   6. Early and late finish dates.
   7. Activity duration in workdays.
   8. Total float or slack time.
   9. Average size of workforce.
   10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
   1. Identification of activities that have changed.
   2. Changes in early and late start dates.
   3. Changes in early and late finish dates.
   4. Changes in activity durations in workdays.
   5. Changes in the critical path.
   6. Changes in total float or slack time.
   7. Changes in the Contract Time.

H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
   1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
   2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
   3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
   4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
      a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
      b. Submit value summary printouts one week before each regularly scheduled progress meeting.

1.11 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
   1. List of subcontractors at Project site.
   2. List of separate contractors at Project site.

3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Testing and inspection.
8. Accidents.
9. Meetings and significant decisions.
10. Unusual events.
11. Stoppages, delays, shortages, and losses.
12. Meter readings and similar recordings.
13. Emergency procedures.
14. Orders and requests of authorities having jurisdiction.
15. Change Orders received and implemented.
16. Construction Change Directives received and implemented.
17. Services connected and disconnected.
18. Equipment or system tests and startups.
19. Partial completions and occupancies.
20. Substantial Completions authorized.

B. Material Location Reports: At weekly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
   1. Material stored prior to previous report and remaining in storage.
   2. Material stored prior to previous report and since removed from storage and installed.
   3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

D. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
   1. Submit unusual event reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION

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. Preconstruction photographs.
   2. Periodic construction photographs.
   3. Final completion construction photographs.

B. Related Requirements:
   1. Section 017700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
   2. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
   3. Section 024119 "Selective Demolition" for photographic documentation before selective demolition operations commence.
   4. Section 311000 "Site Clearing" for photographic documentation before site clearing operations commence.

1.3 INFORMATIONAL SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

B. Digital Photographs: Submit image files within three days of taking photographs.
   1. Submit photos on thumb-drive or by uploading to web-based project software site. Include copy of key plan indicating each photograph's location and direction.
   2. Identification: Provide the following information with each image description in file metadata tag:
      a. Name of Project.
      b. Name and contact information for photographer.
      c. Name of Architect.
      d. Name of Contractor.
      e. Date photograph was taken.
      f. Description of location, vantage point, and direction.
      g. Unique sequential identifier keyed to accompanying key plan.

1.4 QUALITY ASSURANCE

A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years.

1.5 FORMATS AND MEDIA

A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels, and with vibration-reduction technology. Use flash in low light levels or backlit conditions.

B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

C. Metadata: Record accurate date and time and GPS location data from camera.

D. File Names: Name media files with date and sequential numbering suffix.

1.6 CONSTRUCTION PHOTOGRAPHS

A. Photographer: Engage a qualified photographer to take construction photographs.

B. General: Take photographs with maximum depth of field and in focus.
   1. Maintain key plan with each set of construction photographs that identifies each photographic location.

C. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by the Owner.
   1. Flag construction limits before taking construction photographs.
   2. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
   3. Take 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
   4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

D. Periodic Construction Photographs: Take 10 photographs monthly coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

E. Final Completion Construction Photographs: Take 20 photographs after date of Substantial Completion for submission as Project Record Documents. Owner will inform photographer of desired vantage points.

F. Additional Photographs: Owner may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.
   1. Three days' notice will be given, where feasible.
   2. In emergency situations, take additional photographs within 24 hours of request.
   3. Circumstances that could require additional photographs include, but are not limited to, the following:
      a. Special events planned at Project site.
      b. Immediate follow-up when on-site events result in construction damage or losses.
      c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
      d. Substantial Completion of a major phase or component of the Work.
      e. Extra record photographs at time of final acceptance.
      f. Owner's request for special publicity photographs.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01 33 00 - SUBMITTAL 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:
   1. Submittal schedule requirements.
   2. Administrative and procedural requirements for submittals.

B. Related Requirements:
   1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
   2. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
   3. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
   4. Section 013233 "Photographic Documentation" for submitting preconstruction photographs, periodic construction photographs, and final completion construction photographs.
   5. Section 014000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
   6. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
   7. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
   8. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
   9. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal Category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Project Officer’s final release or approval.
    g. Scheduled dates for purchasing.
    h. Scheduled date of fabrication.
    i. Scheduled dates for installation.
    j. Activity or event number.

B. Submittal Period: Schedule must indicate submittals required for the Project to be submitted within 21 days of Notice to Proceed.

1.5 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:
1. Project name.
2. Date.
3. Name of Architect.
4. Name of Construction Manager.
5. Name of Contractor.
6. Name of firm or entity that prepared submittal.
7. Names of subcontractor, manufacturer, and supplier.
8. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier; and alphanumeric suffix for resubmittals.
9. Category and type of submittal.
10. Submittal purpose and description.
11. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
12. Drawing number and detail references, as appropriate.
13. Indication of full or partial submittal.
14. Location(s) where product is to be installed, as appropriate.
15. Other necessary identification.
16. Remarks.
17. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on

previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Paper Submittals:
   1. Place a permanent label or title block on each submittal item for identification; include name of firm or entity that prepared submittal.
   2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
   3. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return two copies.
   4. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
   5. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
   6. Transmittal for Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using AIA Document G810 transmittal form.

E. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

F. Submittals for Web-Based Project Software: Prepare submittals as PDF files, or other format indicated by Project software website.

1.6 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
   1. Email: Prepare submittals as PDF package, and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
      a. Architect will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.
   2. Web-Based Project Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
   3. Paper: Prepare submittals in paper form, and deliver to Architect.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
   3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
   4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections so processing will not be delayed because of need to review submittals concurrently for coordination.
      a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the

Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 14 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 14 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow additional time for initial review of each submittal.

D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.7 SUBMITTAL REQUIREMENTS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
   a. Manufacturer's catalog cuts.
   b. Manufacturer's product specifications.
   c. Standard color charts.
   d. Statement of compliance with specified referenced standards.
   e. Testing by recognized testing agency.
   f. Application of testing agency labels and seals.
   g. Notation of coordination requirements.
   h. Availability and delivery time information.
4. For equipment, include the following in addition to the above, as applicable:
   a. Wiring diagrams that show factory-installed wiring.
   b. Printed performance curves.
   c. Operational range diagrams.
   d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
5. Submit Product Data before Shop Drawings, and before or concurrent with Samples.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Identification of products.
   b. Schedules.
   c. Compliance with specified standards.
   d. Notation of coordination requirements.
   e. Notation of dimensions established by field measurement.
   f. Relationship and attachment to adjoining construction clearly indicated.
   g. Seal and signature of professional engineer if specified.
2. Paper Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 24 by 3 inches.
3. BIM Incorporation: Develop and incorporate Shop Drawing files into BIM established for Project.

C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.
   1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
   2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
      a. Project name and submittal number.
      b. Generic description of Sample.
      c. Product name and name of manufacturer.
      d. Sample source.
      e. Number and title of applicable Specification Section.
      f. Specification paragraph number and generic name of each item.
   3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics, and identification information for record.
   4. Web-Based Project Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
   5. Paper Transmittal: Include paper transmittal including complete submittal information indicated.
   6. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
      a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
   7. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
      a. Number of Samples: Submit three sets of Samples. Architect through Project Officer will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.

1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.

E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

G. Certificates:
1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:
1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
    a. Name of evaluation organization.
    b. Date of evaluation.
    c. Time period when report is in effect.
    d. Product and manufacturers' names.
    e. Description of product.
    f. Test procedures and results.
    g. Limitations of use.

1.8 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
    1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
    1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

C. BIM Incorporation: Incorporate delegated-design drawing and data files into BIM established for Project.
    1. Prepare delegated-design drawings in the following format: Same digital data software program, version, and operating system as original Drawings.

1.9 CONTRACTOR'S REVIEW

A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp or by indication in web-based Project software. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.10 ARCHITECT'S REVIEW

A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return it.
   1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action.
   2. Paper Submittals: Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
   3. Submittals by Web-Based Project Software: Architect will indicate, on Project software website, the appropriate action.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Architect will return without review submittals received from sources other than Contractor.

F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 35 16 - ALTERATION PROJECT PROCEDURES

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 special procedures for alteration work.

1.3 DEFINITIONS

A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.

B. Consolidate: To strengthen loose or deteriorated materials in place.

C. Design Reference Sample: A sample that represents the Architect's prebid selection of work to be matched; it may be existing work or work specially produced for the Project.

D. 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.

E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.

F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.

G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.

H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.

I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.

J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.

K. Retain: To keep existing items that are not to be removed or dismantled.

L. Strip: To remove existing finish down to base material unless otherwise indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Preconstruction Documentation: Show preexisting conditions of adjoining construction and site improvements that are to remain, including finish surfaces, that might be misconstrued as damage caused by Contractor's alteration work operations.

B. Fire-Prevention Plan: Submit 30 days before work begins.

1.5 QUALITY ASSURANCE

A. Specialist Qualifications: An experienced firm regularly engaged in specialty work similar in nature, materials, design, and extent to alteration work as specified in each Section and that has completed a minimum of five recent projects with a record of successful in-service performance that demonstrates the firm's qualifications to perform this work.

1. Field Supervisor Qualifications: Full-time supervisors experienced in specialty work similar in nature, material, design, and extent to that indicated for this Project. Supervisors shall be on-site when specialty work begins and during its progress. Supervisors shall not be changed during Project except for causes beyond the control of the specialist firm.

B. Title X Requirement: Each firm conducting activities that disturb painted surfaces shall be a "Lead-Safe Certified Firm" according to 40 CFR 745, Subpart E, and use only workers that are trained in lead-safe work practices.

C. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.

D. Safety and Health Standard: Comply with ANSI/ASSE A10.6.

1.6 FIELD CONDITIONS

A. Survey of Existing Conditions: Record existing conditions that affect the Work by use of measured drawings preconstruction photographs and preconstruction videotapes.
1. Comply with requirements specified in Section 013233 "Photographic Documentation."

B. Discrepancies: Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.

C. Size Limitations in Existing Spaces: Materials, products, and equipment used for performing the Work and for transporting debris, materials, and products shall be of sizes that clear surfaces within existing spaces, areas, rooms, and openings, including temporary protection, by 12 inches (300 mm) or more.

PART 2 PRODUCTS - (Not Used)

PART 3 EXECUTION

3.1 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from alteration work.
1. Use only proven protection methods, appropriate to each area and surface being protected.
2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration work is being performed.
3. Erect temporary barriers to form and maintain fire-egress routes.
4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during alteration work.
5. Contain dust and debris generated by alteration work, and prevent it from reaching the public or adjacent surfaces.
6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
8. Provide supplemental sound-control treatment to isolate demolition work from other areas of the building.

B. Temporary Protection of Materials to Remain:
1. Protect existing materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
2. Do not attach temporary protection to existing surfaces except as indicated as part of the alteration work program.

C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

D. Utility and Communications Services:
   1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by alteration work before commencing operations.
   2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for alteration work.
   3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.

E. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is functioning properly.
   1. Prevent solids such as adhesive or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from alteration work.
   2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

F. Existing Roofing: Prior to the start of work in an area, install roofing protection.

3.2 PROTECTION FROM FIRE

A. General: Follow fire-prevention plan and the following:
   1. Comply with NFPA 241 requirements unless otherwise indicated.
   2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.
      a. If combustible material cannot be removed, provide fire blankets to cover such materials.

B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:
   1. Obtain Owner's approval for operations involving use of open-flame or welding or other high-heat equipment. Notify Owner at least 72 hours before each occurrence, indicating location of such work.
   2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
   3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
   4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
   5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
   6. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed.

Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:

a. Train each fire watch in the proper operation of fire-control equipment and alarms.
b. Prohibit fire-watch personnel from other work that would be a distraction from fire-watch duties.
c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work in each area to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
e. Maintain fire-watch personnel at each area of Project site until 60 minutes after conclusion of daily work.

C. Fire-Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire-watch personnel are trained in fire-extinguisher and blanket use.

D. Sprinklers: Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to sprinklers, shield them temporarily with guards.

1. Remove temporary guards at the end of work shifts, whenever operations are paused, and when nearby work is complete.

3.3 PROTECTION DURING APPLICATION OF CHEMICALS

A. Protect motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm or spillage resulting from applications of chemicals and adhesives.

B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in alteration work program. Use covering materials and masking agents that are waterproof and UV resistant and that will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.

C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.

D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.

E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.4 GENERAL ALTERATION WORK

A. Have specialty work performed only by qualified specialists.

B. Ensure that supervisory personnel are present when work begins and during its progress.

C. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation photographs or video recordings. Comply with requirements in Section 013233 "Photographic Documentation."

D. Perform surveys of Project site as the Work progresses to detect hazards resulting from alterations.

E. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.
   1. Do not proceed with the work in question until directed by Architect.

END OF SECTION

SECTION 01 40 00 - 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.
4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.

G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

H. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

I. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.4 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
   1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

1.5 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for direction before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.6 ACTION SUBMITTALS

A. Delegated-Design Services Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.7 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For Contractor's quality-control personnel.

C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
   1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
   2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
   1. Specification Section number and title.
   2. Entity responsible for performing tests and inspections.
   3. Description of test and inspection.
   4. Identification of applicable standards.
   5. Identification of test and inspection methods.
   6. Number of tests and inspections required.
   7. Time schedule or time span for tests and inspections.
   8. Requirements for obtaining samples.
   9. Unique characteristics of each quality-control service.

F. Reports: Prepare and submit certified written reports and documents as specified.

G. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.8 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice of Award, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's Construction Schedule.

B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
   1. Project quality-control manager shall not have other Project responsibilities.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
   1. Contractor-performed tests and inspections including Subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
   2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
   3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by Commissioning Authority.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or

defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.9 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
   1. Date of issue.
   2. Project title and number.
   3. Name, address, telephone number, and email address of testing agency.
   4. Dates and locations of samples and tests or inspections.
   5. Names of individuals making tests and inspections.
   6. Description of the Work and test and inspection method.
   7. Identification of product and Specification Section.
   8. Complete test or inspection data.
   9. Test and inspection results and an interpretation of test results.
   10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
   11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
   12. Name and signature of laboratory inspector.
   13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
   1. Name, address, telephone number, and email address of technical representative making report.
   2. Statement on condition of substrates and their acceptability for installation of product.
   3. Statement that products at Project site comply with requirements.
   4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
   5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   6. Statement whether conditions, products, and installation will affect warranty.
   7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
   1. Name, address, telephone number, and email address of factory-authorized service representative making report.
   2. Statement that equipment complies with requirements.
   3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   4. Statement whether conditions, products, and installation will affect warranty.
   5. Other required items indicated in individual Specification Sections.

1.10 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
   1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
   1. Contractor responsibilities include the following:
      a. Provide test specimens representative of proposed products and construction.
      b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
   2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Commissioning Authority, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.11 QUALITY CONTROL

A. 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.
   2. Engage a qualified testing agency to perform quality-control services.
      a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
   3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
   4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
   5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
   6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

B. 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.

C. Testing Agency Responsibilities: Cooperate with Architect, Commissioning Authority and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
   1. Notify Architect, Commissioning Authority, 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.

D. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

E. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

F. Associated Contractor Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspection equipment at Project site.

G. 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.

H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses.
   1. Distribution: Distribute schedule to Owner, Architect, Commissioning Authority, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.12 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Engage a qualified testing agency 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, Commissioning Authority, 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 and Commissioning Authority 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.

B. Due to structural modification of existing CMU shear wall, this Project will require a Statement of Special Inspections for permit and project completion. Refer to manual attached to this section for requirements at pre-construction and throughout construction.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
   1. Date test or inspection was conducted.
   2. Description of the Work tested or inspected.

3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's, Commissioning Authority's, reference during normal working hours.
1. Submit log at Project closeout as part of Project Record Documents.

3.2 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

ATTACHEMENTS:

Pre-Construction Manual Based on 2015 VCC, prepared by Department of Community Planning, Housing and Development, Inspection Services Division; dated May 1, 2019.

ARLINGTON COUNTY, VIRGINIA

DEPARTMENT OF COMMUNITY PLANNING, HOUSING & DEVELOPMENT

INSPECTION SERVICES DIVISION

2100 Clarendon Boulevard, 10th Floor, Arlington, VA 22201

PRE-CONSTRUCTION MANUAL

BASED ON 2015 VCC

2019

May 1, 2019

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SPECIAL INSPECTIONS PROGRAM

CHAPTER 1
ADMINISTRATION

1.1 INTRODUCTION

The purpose of this document is to define the Arlington County's Special Inspection Program (SIP) procedures as required by, and in accordance with the 2015 Virginia Uniform Statewide Building Code (VUSBC) and the 2012 International Building Code (IBC):

1.2 STRUCTURES AND BUILDING ELEMENTS SUBJECT TO SPECIAL INSPECTIONS

The SIP shall apply to newly constructed building element and modifications to existing building element and/or foundation element and/or element fabrication procedures that are subject to special inspections required by the 2015 IBC and the 2015 VUBC. Special inspections are required for:

- Steel construction in according with VCC 1705.2
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- Special inspection shall also be required for the proposed work that is, in the opinion of the building official, unusual in its nature, such as, but not limited to, the following examples:
  1. Unusual design applications of material described in this code.
  2. Construction material and system that are alternative to materials and system prescribe by this code.
  3. Materials and system required to be installed in according with additional manufacturer's instructions that prescribe requirement not contained in this code or in standards referenced by this code.
  4. Sheeting and shoring, underpinning, curtain walls, facade, etc.

EXCEPTION:

1. Special inspections are not required for work of minor nature or as warranted by conditions in the jurisdiction as approved by the building official.

2. Special inspection and tests are not required for one story buildings under 20 feet in height which do not exceed 5000 square feet in building area. And alteration to Group U structures which do not increase loads in according with section 603.7.3 and 603.7.4of the VEBC

3. Unless otherwise required by the building official, special inspections are not required for occupancies in groups R-3, R-4 or R-5 and occupancies in group U that are accessory to a residential occupancy including, but not limited to, those listed in section 312.1 VCC.

4. Special inspection is not required for portion of structures designed and constructed in accordance with the cold-formed steel light-frame construction provisions of section 2211.7.

1.3 PERMIT REQUIREMENTS

A valid building permit must be obtained prior to start of the work.

1.4 STATEMENT OF SPECIAL INSPECTION

Owners of buildings and structures whose elements are subject to special inspections must submit, prior to or during preconstruction meeting, a Statement of Special Inspections (SSI). The SSI shall identify the name(s) of the Special Inspection Engineer of record (SIER) and the Inspection and Testing Agency retained by the owner to provide special inspection and testing services. This statement shall include a complete list of materials and work requiring special inspections and the inspections to be performed.

1.5 FEES AND COSTS

Fees and costs associated with the performance of special inspections shall be borne by the owner. Contractors are not permitted to hire engineers, architects and laboratories associated with Special Inspection.

1.6 PRIMARY RESPONSIBILITIES

The following are general responsibilities of the principal parties to the construction project that are affected by Special Inspections. This list is not intended to be all-inclusive. Additional responsibilities may be assigned to the parties identified below, and others, by the owner or the County.

1.6.1 Owner (Owners' Representatives)

- Shall submit permit applications that include a complete statement of special inspections.
- Shall retain all professionals involved in the process of Special Inspection.
- Shall submit time schedules.
- Shall schedule and conduct pre-construction meeting.
- Shall notify the County when project begins.
- Shall oversee the design and construction and permitting for the project to ensure that the project is in compliance with approved construction documents.
- Shall notify the County if there is a change in the design team and reasons for the change.
- Shall assure prompt distribution of inspection activity reports.
- Shall submit all structural revisions to the Structural Engineer of Record (SER) for review and approval, prior to commencement of the work. A copy of the SER-approved revisions must also be submitted to the SIER & County (when required) prior to commencement of the work.

1.6.2 Special Inspection Engineer of Record (SIER)

- Shall be retained by the Owner.

- Shall provide construction observation and testing services of required scope and frequency to offer a professional opinion that the constructed project was built in accordance with the County-approved construction documents, and that construction has been tested and inspected in accordance with the SSI and applicable codes and standards.
- Shall work with the owner and in concert with other members of the design team to develop the Statement of special inspections.
- Shall verify that all fabricators of structural elements comply with applicable quality assurance programs.

The SIER shall provide special inspections as indicated below:

A. Earth Retention System

Earth retention system shall be designed by a structural engineer licensed in the Commonwealth of Virginia. Designs shall be submitted to the SER for review and comment. The SER shall review and develop a comprehensive inspection list based on the specific needs of the project design. The inspection procedure shall be submitted to the County prior to commencement of construction.

I. Pile/Soldier Beam Installation

- Inspect all types of sheeting and shoring installation
- Inspect the drilling and backfilling
- Inspect the pile size and location as well as plumbness

II. Lagging

- Inspect lagging for size, location, and condition

III. Tieback Installation

- Inspect tieback installation to verify size, anchor length, number of strands, elevation, and angle of declination
- Inspect grouting of tiebacks and take samples as needed
- Inspect the tie back free, bond, and tail length

IV. Rock Bolts

- Inspect location, size, and bonded length

V. Tieback Testing

- Ensure that all hydraulic jacks are used to perform anchor tensioning have current calibration and that the gauge is calibrated to appropriate increments.
- Continuously inspect the contractor's proof test and performance test for tieback
- Continuously verify that the lock off loads are consistent with approved plans and specifications
- Review all contractors' data with regards to installation and testing of the tie back anchors.

VI Bracing Members

- Inspect material, size, location, angle of declination and welds

VII Support of Excavation (SOE) Monitoring.

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- Provide periodic monitoring of the adjacent structure, SOE, inclinometers and settlement point at the site.
- Verify that all monitoring data is below the threshold value established for the project.
- Frequency of monitoring shall be at least twice a week.

VIII Crack monitoring

- The perimeter of the job should be walked to look for out of the ordinary condition such as cracks in the street or sidewalks, settlement of soil along adjacent building, non-level lagging board, that may indicate undue stress in the system.
- A survey for the adjacent building shall be conducted to document any existing crack on the building element, also crack monitoring shall be installed to any significant cracks, reading shall be recorded at least every bi weekly.

B. Underpinning

All underpinning shall be designed by a structural engineer licensed in the Commonwealth of Virginia. Designs shall be submitted to the SER for review and approval. The SER shall review and develop a comprehensive inspection list based on the specific needs of the project design. Any building within a 3H: 1V zone of influence from the edge of excavation and dewatering system should be monitored for settlement and lateral deflection during construction. The inspection procedure shall be submitted to the County prior to the commencement of construction.

Note:

Appendix B contain a copy of the sheeting and shoring statement of special inspection

C. Soils and Foundation System Inspection and Testing Services

1. Soils

a. inspect proof-rolling and delineate unsuitable materials within areas proposed for support or structural fill, ground slabs and pavement areas.
b. Conduct laboratory tests on samples of proposed fill materials.
c. Inspect placement of engineered fill and backfill materials.
d. Conduct field density tests on placed compacted fill.
e. State that fill placement was performed in accordance with approved construction documents.
f. At least one soil technician shall be present full-time during compaction of structural fill material.

2. Foundations – Footings and mat foundation

a. Conduct foundation excavation inspection & testing to determine adequate bearing.
b. Conduct inspection and testing to determine adequate reinforcement.
c. State that in his/her professional opinion the footings are bearing on sub grades capable of supporting the design loads.
d. Conduct inspection of basement and retaining walls for conformance to the County approved construction documents.

3. Pile Foundations

a. Inspect test pile driving and record data. The data is to include type and size of hammer, the rate of penetration, and the type and dimensions of casings.
b. Inspect load tests on test piles and record data to determine if tests were performed in accordance with project specifications.
c. Analyze load test data and provide driving criteria, including revised estimated pile tip elevations at test boring locations.
d. Inspect pile driving and keep a record of each pile driven containing specifications of pile hammer used, pile dimensions, tip and cut-off elevation of piles, blow count for pile as specified, plumbness of pile, and as-built location obtained from contractor's survey, and other pertinent information pertaining to the pile and it's driving.
e. Ascertain that piles do not exceed driving tolerances as to location, plumbness, and batter angle.
f. State that in his/her professional opinion all piles were driven and developed bearing capacity in accordance with specifications.

4. Caissons

a. Inspect the drilling of the caissons to assure sufficient penetration of transition material to develop design side wall skin friction and/or end bearing as required.
b. Ascertain that caissons are not placed beyond established tolerances for plumbness.
c. Inspect and approve caisson prior to placement of concrete only after the approved criteria has been met.
d. Inspect rebar and concrete placement.
e. State that the caissons have been placed in accordance with approved plans and specifications.

5. Records and Certification

Upon completion of the Geotechnical Engineering Services provide a certified document stating that to the best of his/her knowledge and in his/her opinion the construction of soils and foundations has been completed in accordance with the requirements of the project plans and specifications and the Arlington County Building Code.

D. Super Structure Inspecting and Testing Services

(See the SSI for required verification and inspections of concrete construction)

1. Concrete Structures

a. Formwork and Reinforcing

I. Inspect formwork, shoring, and reinforcing prior to placing concrete.

II. Authorize in writing the stripping of formwork and re-shoring prior to removal of these materials only after the criteria approved by SER has been met.

III. Stripping letter requirement
The SIER shall initiate a stripping letter when concrete strength have achieved the levels specified by the SER, the test result for the field-cured cylinders shall be included and the stripping requirement as stated in the county approved documents, the stripping letter shall contain the seal and signature of both the SIER and the SER, the stripping letter shall include the minimum require concrete strength for stripping, that was established by the SER , the stripping letter shall also include cold weather temperature loge and post-tension stressing recorded, all stripping letter shall be send electronically to Arlington County prior to stripping.

b. Batching

I. Inspect batching tickets and delivery operations for compliance with the project specifications.

c. Compression Tests

I. Label each compression cylinder identifying the truck load of concrete from which sample was taken and the exact location in construction where deposited.

II. Test Cylinder. Concrete samples for strength testing (both laboratory- cured and filed-cured cylinder) shall be taken in according with ASTM C 172. Concrete test cylinders shall be 6x12 inches in size, with two 6x12 inch cylinders cast for each test.
Exception: Concrete test cylinder may be 4x8 inches in size, subject to the following condition:

- The use of alternative concrete test cylinder shall be specified by the structural engineer of record on a case by case basis.
- The use of alternative concrete test cylinders shall be considered by the county on a case by case basis.
- The use of alternative concrete test cylinder shall be limited to 8000 PSI maximum compressive strength at 28 days
- Concrete mix design shall be adjusted for the alternative concrete test cylinder and shall be reapproved by the structural engineer of record.
- Three 4x8 inch cylinder shall be cast for each test.

III. Test specimens in accordance with ASTM standard “Method of Test for Compressive Strength of Molded Cylinders.”

IV. Field- cured cylinders. As-per. where required by the building official to determine adequacy of curing protection of concrete in the structure, specimens shall be prepared, cured, tested and test results evaluated for acceptance in according with ACI318, Section 5.6.4

Filed –cured cylinder shall be cured as closely as possible to the location of placement of the concrete pour they represent and be exposed as nearly as possible to the same temperature and moisture environment, in accordance with ACI 318 and ASTM C 31.,

Field-cured cylinder for concrete to be pumped shall be taken at the point of discharge (end of the hose) and shall be stored on the deck under the same atmospheric condition as the placed concrete.

Field- cured cylinder is required to evaluate the strength of concrete prior to the removal of concrete formwork, shoring& re-shoring, also prior to stressing post-tensioning cable in order to determine the adequacy of curing and protection of the concrete.

V. Field cured test specimens for frame slab.

- Prior to striping and stressing-post tension cables as per project specification (2-4 days)
- 2-7 day
- 2-28 day

VI Stripping

- When a pour is at least three (3) days old and field cured test cylinders indicate a concrete strength more than 75% of the design strength, the slab shall first be re-shored and then the horizontal and vertical formwork can be removed.
- Reshoring shall be completed for each bay before removing formwork in adjacent bays.
- Under no circumstance formwork shall be removed until concrete has reached a minimum of 75% of the design concrete as determined by field cured concrete test cylinders.
- No added construction loads are permitted on slab while reshoring.
- Stripping letters shall be signed and seal by both the SIER and SER unless the SER wave his approval for the non-post tension part to the SIER (waiver letter shall be submitted to ISD).
- Inspection Services Division reserve the right to review and approved the stripping prior issuing it and that will determine in a case by case.
- No stripping procedure under any circumstance shall be commence with the stripping letter been approved and emailed to the assign ISD structural engineer.

d. Carbon Fiber FRP (fiber reinforce polymer)

- FRP inspection is per ACI 440.2R- 08-chapter 7 section 7.1, including the FRP Pull-off strength test as per ASTM D7 522/ D7 522M-09
- FRP shall be fire proof by a listed membrane.

e. Connections

I. Inspect all connections between precast concrete and cast-in-place concrete.
II. Inspect anchor bolts, plates, etc. installed in the concrete.

Note:

Appendix C contains copies for concrete cold weather log and stripping / stressing authorization request.

2. Post-Tension Concrete Structures

a. Inspect formwork, tendons and reinforcing prior to placing of concrete.
b. Inspect all placing of concrete.
c. Inspect all tensioning and keep elongation records.
d. Grant permission to contractor prior to all burning, cutting or capping of pre-stressing anchorage only after the criteria approved by SER has been met. Perform testing of concrete as for cast-in-place concrete except as modified in the specifications for post-tensioning structure.

3. Structural Steel Structures

(See SSI for required verification and inspection of steel construction)

a. Check setting of anchor bolts and base plates.
b. Determine that members are properly placed and that member sizes and locations are in accordance with approved plans.
c. Check field welders' qualifications by examining their certificates.
d. Inspect erected members for proper workmanship and to determine that members are plumb and level.
e. Inspect shop and field connections for proper workmanship.
f. Inspect and test welds and connectors as required by project specifications.
g. Test any shop weld that appears questionable.
h. Inspect connections to frame (such as welded connections, mechanical connections, etc.)
i. Inspect sprayed-on fireproofing.
j. Inspect shear studs.
k. Inspect steel deck to ensure that it is properly placed, connected and that it is sized and located in accordance with approved plans.
l. Inspect steel joist to ensure that they are properly placed and that they are sized and located in accordance with approved plans.
m. Inspect end anchorage, bridging connection. Make sure bridging is installed at appropriate time in erection sequence.

4. Structural Masonry Structures

(See SSI for required Level 1 & Level 2 Special Inspections)

a. Inspect placing of masonry units.
b. Inspect placement of reinforcing.
c. Inspect placement of grout/mortar.
d. Conduct prism tests per contract documents.

5. Precast Concrete Structures

a. Shall provide full time inspection and observation of fabrication process.
b. Shall provide full-time construction observation and inspection of erection process in accordance with erection plans and sequence.
c. Shall notify appropriate design professionals of record and the County if inspection and/or test results do not meet the requirements of the County-approved construction documents.
d. Shall ensure that all required approvals are obtained prior to inspection, approval and continuation of construction.
e. Shall submit a final report of special inspections.
f. SEE CHAPTER 3 for additional requirements
g. Records and Certification

Upon completion of the structural phase of the building, the inspection agency shall provide a certified document stating that to the best of his/her knowledge and in his/her opinion the construction of the super structure has been completed in accordance with the requirements of the project plans and specifications and the Arlington County Building Code.

1.6.3 Structural Engineer of Record (SER)

- Must be retained by the Owner.
- Shall have the ultimate responsibility for **all** structural elements of the building.
- Shall review and design **approval** structural shop drawings including all connections.
- Shall review and design **approval** structural members and connections designed and/or fabricated by the steel fabricator.
- Shall **approve** concrete and grout mix designs.
- Shall review and design approval formwork design and criteria for removal of the formwork.
- Shall review and approve sheeting and shoring design. SER shall also establish and submit the criteria for inspection, testing and removal of sheeting and shoring.
- Shall approve construction bracing designs, mortar and grout mix designs and other building element designs that affect the approved structural construction documents for conformance with those documents.
- Shall review construction observation and testing reports/records provided by the SIER for conformance with the approved structural construction documents and the VUSBC and takes appropriate action(s) as required. Confirm temporary and final support for vertical load from precast design calculations and erection drawings.
- Provide temporary and final support for gravity and lateral loads at the bottom of precast columns/walls from the precast design.
- Provide temporary and final support of eccentric loads from precast design.
- Review and approve precast erection drawings, including erection sequencing and bracing and grouting plans.

- Upon completion of foundation and superstructure, provide a professional opinion that the project complies with the structural construction documents and specifications and Arlington County Building Code.

1.6.4 Geotechnical Engineer of Record (GER)

- Shall be retained by the Owner.
- Shall prepare and issue geotechnical report of subsoil evaluation.
- Shall prepare design criteria for foundations and foundation systems.
- Shall revise geotechnical recommendations if site soil or groundwater conditions differ materially from conditions indicated on the approved geotechnical report, coordinate changes with the design professionals of record responsible for the structural design of foundations, deep foundations or other types of foundation systems.
- Upon completion of the geotechnical phase of the building, the GER shall provide a certified document stating that to the best of his/her knowledge and in his/her opinion the construction of the soils and/or foundation systems (as appropriate) has been completed in accordance with the requirements of the project plans and specifications and the Arlington County Building Code

1.6.5 General Contractor (GC)

- Shall have the ultimate responsibility for the construction.
- Shall provide the means, methods and materials and temporary shoring and support of construction.
- Shall coordinate construction and verify, as necessary, so that the building is capable of carrying construction loads.
- Shall take necessary action to assure a safe job site and meet OSHA, VOSHA, and other job site safety responsibilities.
- Shall submit construction documents to the County as identified at the preconstruction meeting.
- Shall notify the County and appropriate design professionals of record of construction schedules as identified at the preconstruction meeting.
- Shall schedule and coordinate that the required inspections are conducted and approved prior to proceeding with the work.
- Shall not conceal any work without prior approval of the inspecting professional.
- Shall ensure that all required approvals are obtained prior to continuation of construction.
- Shall provide temporary shoring and bracing as required to maintain stable structure during all stages of construction.
- Upon completion of the work shall provide a professional opinion that to the best of his/her knowledge, information and belief, the work has been constructed in accordance with approved plans, specifications, Arlington County Building Code and the SSI.

1.7 PRECONSTRUCTION MEETING

A pre-construction meeting is required for every project whose elements are subject to special inspections as a condition of permit issuance. The meeting shall take place after plans have been reviewed and approved by the County but prior to the issuance of a permit.

The SSI and the qualifications of the SIER and/or the Inspection and Testing Agency Engineer of Record are also reviewed again by County building officials and approved at the preconstruction meeting prior to the issuance of a permit.

1.7.1 Participants

The following members of the construction team shall participate in pre-reconstruction meetings, as required:

- Owner or owner's duly authorized representative
- Structural Engineer of Record (SER)
- Architect of Record
- Special Inspector (SIER)
- General Contractor (GC)
- County building officials
- Professional in charge of geotechnical services, as required.
- Professional in charge of structural inspection, as required.
- Professional in charge of fabricated building elements.

1.7.2 Purpose

The purpose of the preconstruction meeting is to review the special inspection requirements of the project and establish communications among the project team members. The parties shall agree on the scope of inspection. The Owner shall submit a Statement of Special Inspections (SSI). At a minimum, the following shall be discussed:

a. **Project Construction Requirements:** Project construction requirements of the Arlington County Special Inspections Program (SIP), including construction methods, site safety and fire hazard prevention during the construction process.

b. **Statement of Special Inspections (SSI):** The scope of special inspections for the project.

c. **Qualifications**: Qualifications of proposed inspection professionals and testing agencies, including evidence of laboratory accreditation and technician certification from recognized authorities subject to the approval of the County. These qualifications documents shall be submitted before, or at preconstruction meeting, prior to commencement of permitted work.

d. **Responsibilities:** The roles and responsibilities of each party.

e. **Communication:** Communication channels between the County and owner's representatives and members of the design and construction teams.

f. **Phased Construction:** Requirements for phasing of permits, certificates of completion and occupancy requirements.

g. **Revision:** requirements for revised shop drawings, revisions to construction documents, etc.

h. **Inspections:** Requirements for special inspections & code inspections, to include requirements for approval of revised plans prior to scheduling inspections.

1.8 REPORTS AND COMMUNICATION FLOW

The SIER shall keep records of inspections. The SIER shall furnish inspection reports to the building official as required by the SSI and this manual, to the owner or owner’s designee and to the registered design professional as appropriate. Discrepancies shall be brought to the immediate attention of the contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the building official and to the registered design professional of record, prior to the completion of that phase of the work. A final report of inspections documenting required special inspections and correction of any discrepancies noted in the inspections shall be submitted.

Any deviation from the approved construction documents must be brought to the immediate attention of the registered design professional of record and the Building Official.

The SIER shall provide reports of special inspection signed and sealed by the professional in charge as required by the SSI and this Special Inspections document within five business days. Deficiency reports shall be submitted within three business days.

1.9 DEFICIENCY REPORTS

Deficiency reports shall describe the nature and specific location of the deficiency and include a description of the action recommended by the appropriate professional in charge. Each deficiency item, by discipline, shall be sequentially numbered.

1.10 FINAL REPORT OF SPECIAL INSPECTIONS

Upon completion of the specified special inspections and testing, the SIER, and other design professional(s) of record providing special inspections and observation and testing services shall submit a final report of special inspections to the County, owner and others designated by the owner. Reports shall indicate that work inspected was done in conformance to approved construction documents.

1.11 PERSONNEL QUALIFICATIONS

In accordance with the provisions of the VCC, except for registered design professionals, field personnel shall be certified by examination through ICC, ACI, AWS, ASNT, NICET, WACEL or other organizations whose programs are recognized by the County. Inspection and Testing Agency personnel shall perform only those services in which they have demonstrated competency through such a recognized certification or registration program.

1.11.1 Unusual Functions

In the event there is no certification program applicable to a specific function, the SI shall submit, to County, a signed statement attesting to the competency of personnel and identifying the basis upon which such statement is made.

1.11.2 Laboratory Qualifications

Laboratory facilities must be accredited by an agency such as A2LA, NVLAP, WACEL or other organizations whose programs are recognized by the County. All laboratory facilities must meet the requirements of ASTM E329, ASTM D3740, and ASTM C1077 as applicable. The SIER shall accredit on-site laboratory facilities in accordance with ASTM E329.

1.11.3 Resumes

The SIER shall submit resume and documentation, for approval by the county, of inspection and testing Personnel and laboratories prior to the pre-construction meeting.

1.12 CHANGES IN SPECIAL INSPECTIONS TEAM

In the event that the design professionals or inspection and testing agencies of record need to be changed during the course of the project, the owner shall notify the County, and submit documentation of

qualifications, of new replacement personnel. The County shall approve or deny such replacement. The owner shall provide to the County a written explanation as to the reason for such change; shall identify the replacement organization or individual with whom he has contracted; shall furnish the documentation necessary to show such organization or individual is qualified for the work as required herein, and shall provide a revised inspection agreement signed by the new party. The County shall stop work if, in the County's opinion, work otherwise would proceed without adequate inspection, and shall authorize a recommencement of work only at such time as it is satisfied that the integrity of the inspection can be assured.

1.13 OBLIGATIONS OF PARTIES TO THE CONSTRUCTION

The organizations and individuals performing inspections are responsible for the adequacy of their work. In addition, any conditions which they believe are **not justifiable or outside the scope of this agreement** shall be reported to the owner, general contractor, and the Building official.

1.14 MODIFICATION TO APPROVED DRAWINGS

All individuals involved with this program in an inspection capacity are charged with a responsibility to report to the county representative any error, omission, inconsistency or ambiguity in the approved plans. Appropriate revisions shall be developed. When time permits, or when the changes are in the opinion of the appropriate county representative, substantial enough to so warrant, such revisions shall be submitted to the county for review and approval. Otherwise, a statement of revision shall be submitted to the county by the architect or engineer of record prior to commence of work

1.15 DETECTION OF CRITICAL PROBLEMS

Any individual involved in the inspection function who detects a condition which in his or her opinion justifies a stop-work proceeding or other immediate remedial measure, shall so notify the supervisor of the function in question. If the supervisor is not present, or if the supervisor is unable or unwilling to take what is deemed to be appropriate corrective measures, the person detecting the condition in question shall directly contact the building official.

1.16 STATEMENT OF SPECIAL INSPECTIONS (SSI)

Permit applicants are required to submit a statement of special inspections prepared by the SER as a condition for permit issuance and preconstruction meeting. This statement shall include a complete list of materials requiring special inspections by this section, the inspections to be performed and a list of the individuals, approved agencies and firms intended to be retained for conducting such inspections.

The model statement can be used "as is," but is designed with the flexibility to be modified to meet the unique requirements of a specific project.

Pages 43- 62 are designed to be submitted with plans and specifications as part of the permit application process. Page 1 identifies the project name, location, owner, Architect, Structural Engineer, Geotechnical Engineer, Special Inspections Professional of Record, the Inspections and Testing Agency Engineer of Record if different from the Special Inspections Professional of Record and General Contractor. The Schedule of Special Inspections identifies the scope of observation and testing services, following VCC Section 1704 requirements. The qualifications of the Special Inspections Professional of Record and/or the Inspections and Testing Agency Engineer of Record are reviewed and approved by the County as part of the permitting process.

Note:

Appendix A contains a copy for the statements of special inspection for building also appendix B contains a copy for the statement of special inspection for sheeting and shoring.

1.17 FINAL REPORT OF SPECIAL INSPECTION AND CERTIFICATE OF COMPLETION

The Final Report of Special Inspections and Certificate of Completion shall be submitted after the Special Inspections specified for the project have been completed.

FINAL REPORT OF SPECIAL INSPECTIONS

Project Name: _____

Project Address: _____

Permit Number: (A/P): _____

SPECIAL INSPECTIONS ENGINEER OF RECORD (SIER): _____

All deficiency items reported in the last interim report(s) have been completed. To the best of my information, knowledge and belief, the special inspections specified for this project, itemized in the Statement of Special Inspections submitted for permit, have been completed. In my professional opinion, building elements subject to special inspections have been found to comply with County-approved construction documents and project specifications.

Respectfully submitted,

_____

Signature of Special Inspection Engineer (SIER) Date

_____

Seal

CERTIFICATE OF COMPLETION

Project Name: _____

Project Address: _____

Permit Number: (A/P): _____

STRUCTURAL ENGINEER OF RECORD (SER): _____

All deficiency items reported in the inspection reports have been corrected. To the best of my information, knowledge and belief, the special inspections specified for this project have been completed. In my professional opinion, the structure is constructed in accordance with the approved construction documents and project specifications and is in compliance with County building codes and regulations.

Respectfully submitted,

_____

Signature of Structural Engineer of Record Date

_____

Seal

CERTIFICATE OF COMPLETION

Project Name: _____

Project Address: _____

Permit Number: (A/P): _____

PRECAST ENGINEER OF RECORD (PER): _____

All deficiency items reported in the inspection reports have been corrected. In my professional opinion, the structure has been fabricated and constructed in accordance with the approved construction documents and project specifications and is in compliance with County building codes and regulations.

Respectfully submitted,

_____

Signature of Precast Engineer of Record Date

_____

Seal

CERTIFICATE OF COMPLETION

Project Name: _____

Project Address: _____

Permit Number: (A/P): _____

GEOTECHNICAL ENGINEER OF RECORD (GER): _____

All deficiency items reported in the inspection reports have been corrected. To the best of my information, knowledge and belief, the geotechnical inspections specified for this project have been completed. In my professional opinion, the soil and/or foundation system for this structure is constructed in accordance with the approved construction documents and project specifications and is in compliance with County building codes and regulations.

Respectfully submitted,

_____

Signature of Geotechnical Engineer of Record Date

_____

Seal

CERTIFICATE OF COMPLETION

Project Name: _____

Project Address: _____

Permit Number: (A/P): _____

GENERAL CONTRACTOR (GC): _____

All deficiency items reported in the inspection reports have been corrected. To the best of my information, knowledge and belief, the special inspections specified for this project have been completed. In my professional opinion, the structure is constructed in accordance with the approved construction documents and project specifications and is in compliance with County building codes and regulations.

Respectfully submitted,

_____

Signature of General Contractor Date

CHAPTER 2
DEFINITIONS

The following words and terms shall, for the purposes of this manual and the County's Special Inspections Program have the meaning delineated below.

Architect of Record (AR): The Registered Design Professional retained by the owner to design and specify architectural construction and whose signature and seal appears on the County-approved architectural construction documents.

Certification: A statement of professional opinion by a registered design professional that indicates that the item(s) under consideration meet the requirement of the County-approved construction documents and this manual. Certifications shall bear the original seal and signature of the design professional making the statement.

Completion Letter: A certification letter signed and sealed by the design professional(s) of record who performed special inspections stating that the construction elements specified for special inspections have been inspected and conform to the County-approved plans, specifications and this manual.

Construction Documents: Plans and specifications and other documents prepared for the purposes of obtaining a building permit.

County-Approved Documents: Construction documents approved by Arlington County Building Official.

Fabrication and Erection Documents: Written, graphic and pictorial documents prepared or assembled after issuance of a building permit describing the design, location and physical characteristics of building components or materials necessary for fabrication, assembly or erection of project elements.

Final Report of Special Inspections: A certification by the Special Inspections Professional of Record (SIER) indicating that specified special inspections are completed and meet the requirements of the County-approved construction documents, project specifications and this manual.

Inspection: The periodic observation of work and the performance of tests for certain building or structure components.

Inspection and Testing Agency: Agency or agencies retained by the Owner and approved by the County to perform special inspections and materials testing as required by IBC and the County. Contractors are barred from retaining the services of inspection and testing agencies for Special Inspections.

Non-Structural Elements: Elements of a building that are not primary or secondary structural elements such as exterior curtain walls and cladding, non-load-bearing partitions, stair railings, etc.

Owner: Owner or owners of the freehold premises or lesser estate therein, a mortgagee or vendee in possession, assignee of rents, receiver, executor, trustee, or lessee in control of a building/structure to be constructed/altered or the owner's duly authorized representative.

Special Inspection Engineer of Record (SIER): The registered design professional retained by the owner to provide special inspections and material testing services as specified by appropriate design professionals of record and approved by the County. The SIER maybe an agent of, or independent of the Inspection and Testing agency or the project's SER.

Statement of Special Inspections (SSI): A statement prepared by the Owner and appropriate registered design professionals of record (GER, SER, PER) and submitted by the permit applicant for review and approval by the County. The SSI indicates the scope of special inspections applicable to a construction project and identifies the names and qualifications of the design professionals and inspection and testing agencies that will provide those services.

Structural Engineer of Record (SER): The registered structural engineer retained by the owner to have ultimate responsibility to design or specify structural documents and specifications.

CHAPTER 3
ADDITIONAL REQUIREMENTS

3.1 PRECAST CONCRETE

This section delineates the responsibility of individuals in charge of design, fabrication, erection, structural support, and handling of precast concrete building elements and its associated material testing and handling.

3.1.1 Project A/E Team

Project A/E team shall issue specific precast specifications including, but not limited to, erection methods, tolerances and final tolerances and appropriate safety regulations

3.1.2 Precast Erector

The precast erector shall perform or obtain a pre-erection survey of all bearing surfaces and connections embedment in the cast-in-place concrete construction intended for the support or connection of the precast concrete. Any deviation from the precast drawings shall be coordinated with both the precast engineer and the structural engineer of record.

3.1.3 Precast Engineer

The Precast Engineer is the registered design professional in charge of precast design and fabrication and shall be responsible for and shall provide the following services:

- Prior to erection of any precast pieces; precast engineer must arranged a preconstruction meeting with owner, SER, GC, precast supplier, inspectors, and erector's foreman. Focuses of this meeting would be on the safety, alignment issues, crane operation, or any other item that SER requires to be dissuaded. Minutes of this meeting and signature sheet of attendants with the date and location of where meeting was held must be recorded and submitted to the county prior to start of erection of precast.

- Submit to the Structural Engineer of Record (SER) for review and approval the following:

  a. Detailed signed and sealed erection and temporary bracing/shoring plan that indicates overall sequence and specific localized erection procedures. It must indicate when and at what stages temporary bracing is to be installed. It must indicate precisely what connections are required and when, what length and size of weld, etc.
  b. Detailed piece drawings of every fabricated piece.
  c. Specify in advance of the erection what is in tolerance and what would be out of tolerance. Specification must also indicate what is acceptable and what is not.
  d. Complete design calculations - all elevations.
  e. Confirm detailing and manufacturer of elements per design calculations.
  f. Provide all connection details with a numbered sequence as to when, in the process, 00% completion of each connection vis-a-vie erection sequence as required.

g. Submit signed and sealed detailed Erection Sequence, Bracing and Grouting Sequence and Timing Plan for each element, type, and sequence of entire precast building.

h. Shall prepare, for review and approval by SER, ***erection, bracing and grouting sequence and timing plan*** describing, in detail (using erection drawings as a template) complete details and sequencing of routing, bracing, etc. And systems to deal with misfit elements

i. Upon completion of the work shall provide a professional opinion that to the best of his/her knowledge, information and belief, the work has been constructed in accordance with approved plans, specifications, Arlington County Building Code and the SSI

3.1.4 Erection Inspections

The erection process must be conducted under the full-time observation of the SIER. Daily reports must be furnished by the SIER. The inspection and inspection reports must address the items identified in the ***erection, bracing and grouting sequence and timing plan*** and the following:

Columns – erection and final
- Plumbness
- Grout under and above base plates in daps
- Grout at column splices
- Bolts, dowels, grout and installation

Light walls – erection and final
- Plumbness
- Grout

Spandrel Connections – erection and final
- Bolts
- Grout

Inverted tee beams – erection and final
- Lengths
- Connections
- Grout

Tees – Welds – erection and final
- To tees
- To walls

4.1 EARTH RETENTION SYSTEM

4.1.1 Preparation of Construction Documents

Earth retention system shall be designed by a structural engineer licensed in the Commonwealth of Virginia. Designs shall be submitted to the SER for review, comment, approval, and prior to submitting to Arlington County

4.1.2 Review and Approval

Two copies of the earth retention system construction documents and related calculation shall be signed and sealed and submitted by the designed engineer to Arlington County Inspection Services for review and approval, in addition to structural design, the construction documents shall include the following:

1. **System installation criteria**:
    a. Load testing and movement acceptance criteria for anchors.
    b. The allowable lateral movement.
    c. Tieback length (bonded and non-bonded) and angle.
2. **Dewatering**, any requirements for dewatering of the excavation that are specified or assumed in the earth retention system design.
3. **Slope protection**, specification of responsibility for protecting all slopes in according to general practice.
4. **Adjoining properties**, recommendation for protecting adjoining properties, including exciting public and private streets.

4.1.3 Encroachment

When it becomes necessary to encroach on adjoining public or private property to drive piles or tie backs, the applicant shall obtain written permission from the owner of the adjacent property and submit a copy of the owner's permission to Arlington County Inspection Services.

4.1.4 Start of Work

No excavation work may start in field, until submitted plans are reviewed, approved by Arlington County Inspection Services and a permit has been issued.

4.1.5 Change in Design

No changes in design are to be made in field unless authorized by the design engineer of record then approved by SER and Arlington County Inspection Services.

4.1.6 Lagging Installation.

Excavation to install lagging shall not exceed five feet high and all lagging shall be installed prior to excavating further.

4.1.7 Stockpiling

Do not stockpile excavating material immediately adjacent to the excavation walls., unless specifically approved by earth retention system design professional, otherwise stockpile material should be kept back from excavation a minimum distance equal to ½ the excavation depth.

SECTION II

CONSTRUCTION-RELATED REQUIREMENTS

BUILDING ADDRESSING

1. During construction and for permanent addressing, the dwelling unit or building shall have displayed the County assigned street address identification number at the front entrance in a manner as to be visible and distinguishable from the curb line or pavement edge of the opposite side of the street on which the dwelling or building is located or 30 feet into the adjacent street when there is no opposite street. See Arlington County Code 27.12.

2. Building addresses are assigned by Inspection Services Division at the time the building permit application is submitted or earlier when required for zoning variance action or other needs.

3. Each independent building or dwelling unit shall have a separate address.

4. Accessory structures, buildings which are incidental to the main structures, do not have separate addresses (tools sheds, garages, etc.).

5. The address assigned should be the appropriate street number on the public street to which the building's main entrance either faces or is closest. Whenever there is a question as to address, ease of determining the location of the building and access by emergency personnel and equipment shall be the deciding factors.

6. When there is one main street entrance to townhouses or condo units, each individual unit shall be addressed by a single address and a different unit number.

7. In high-rise buildings with a central core and two (2) or three (3) wings, one address will be given and unit numbers may not be duplicated within the building.

8. Townhouse with a separate entrance to a public street shall have a separate street address.

9. When there are not enough address numbers between existing numbers to assign an address, a letter will be placed in the unit field to differentiate the units.

10. Undeveloped property or property not part of an existing parcel will be addressed to the hundred blocks on which it fronts.

11. Address changes shall be considered to correct past mistakes, street redesign, etc. or similar types of request.

12. Temporary addresses shall be issued for temporary construction facilities and sales related buildings such as pavilions according to these rules so that the temporary address will, in most cases, be the address of the final permanent structure.

13. On large residential or commercial projects, Inspection Services will seek input from ECC on the appropriateness of assigned addresses. Comments or suggestions shall be returned by ECC within two (2) days.

ON-SITE CONCRETE BATCH PLANTS

WHEN REQUIRED

The requirements of this section must be met whenever a concrete batch plant is to be used.

PROCEDURAL REQUIREMENTS

Prior to the manufacture of concrete, the SPECIAL INSPECTIONS ENGINEER OF RECORD shall inspect the plant for conformance to standards outlined in this section, and shall verify the accuracy of scales before they are used.

GENERAL SITE REQUIREMENTS

1. Access road shall be at least 20 feet wide.
2. A mud mat shall be large enough to prevent contamination of stock piles.
3. A roadway shall be adequate to prevent delivery trucks from contaminating stock piles
4. Barricades and warning devices shall be installed to prevent workers from entering the working radius of the scraper boom.
5. Stockpiles shall be separated by walls extending to the outside perimeter of the boom radius. These walls shall have a 45-degree minimum angle from the leading edge of the stock pile.
6. All other requirements of ASTM C94, C685 and ACI 304 shall be strictly met.

TOWER CRANES

PROCEDURAL REQUIREMENTS

1. Prior to the placement of crane foundation, the **CRANE OWNER, CONTRACTOR OPERATING THE CRANE**, or the **GENERAL CONTRACTOR** shall submit the following information to Arlington County Inspection Services for review and approval:

   - Crane specifications including manufacturer's operating model number, hook height, boom length, overturn moment, and manufacturer's specification relative to overturn moment, slewing moment, vertical load (minimum and maximum), punching shear, shear per bolt group, uplift per bolt group, compression per corner and horizontal shear (minimum and maximum).

   - Plans showing structural calculations and design of crane foundations signed and sealed by a **PROFESSIONAL ENGINEER** registered in Virginia. Plans and calculations shall clearly indicate footing dimensions, required compressive strength of concrete, steel reinforcement, and allowable soil bearing pressure. The allowable soil bearing pressure shall be consistent with values shown the soil test report for the project prepared by the **GEOTECHNICAL ENGINEER OF RECORD**.

   - Concrete mix design indicating review and approval by the **PROFESSIONAL ENGINEER** responsible for design of crane foundations.

   - Plans, signed and sealed by a professional engineer registered in Virginia, showing the crane location, boom swing and method of support for cranes located within or supported by the

structure. Such plans shall be reviewed and approved by the **STRUCTURAL ENGINEER OF RECORD**.

- A copy of notification to FAA prior to erection.

2. Prior to use of the crane, the **CRANE OWNER, CONTRACTOR OPERATING THE CRANE**, or the **CRANE MANUFACTURER**, shall submit to Inspection Services certification of the crane inspection including:

- Inspection reports addressing soil bearing capacity, foundation inspection reports, and concrete tests.

- Upon completion of the crane foundation, the **SPECIAL INSPECTIONS ENGINEER OF RECORD** shall submit to the county a final report of special inspections for the crane foundation.

INSPECTION AND TESTING PROCEDURES

1. Inspection of soil and footing shall be done by the SIER. A building permit is required prior to the installation of footing, the inspection shall be performed and approved prior to crane installation.

2. An electrical permit shall be obtained and an inspection by Arlington County Inspection Services shall be scheduled immediately upon completion of installation and shall be performed prior to use of the crane.

SAFETY RULES AND REGULATIONS

1. Erection

All cranes shall be erected and maintained in accordance with the manufacturer's recommendations. Erection shall be performed under the supervision of a person experienced in the erection of climbing tower cranes and traveling tower cranes. A copy of the Manufacturer's Manual on Erection and Operation shall be furnished to the operator and kept on the job. No crane is to be erected in the field before all "Procedural Requirements" as set forth in this document are met. Further, the crane shall not be erected before inspection of the crane base, tower sections, jib and counter jib for structural defects by the **CRANE MANUFACTURERE'S REPRESENTATIVE** or a **PROFESSIONAL ENGINEER**.

a. Adequate guys or braces shall be used during erection to prevent collapse of the equipment. All guying and bracing shall conform to the manufacturer's recommendations.

b. The elevation at four points of the crane base shall be checked for settlement or other movement by the contractor at erection, at 30 days after the erection date and every 45 days thereafter. All data must be reported to the Arlington County Inspection Services Division.

c. Cranes shall be equipped with load-limiting devices which shall be set for loads in accordance with the manufacturer's recommendations and sealed at the time of inspection. A record noting any reason for removing or breaking the seal shall be kept on the job site. Devices shall remain sealed during the operation of the crane.

d. Jibs and counter weights shall be erected and maintained so that no part shall strike any building, overhead wiring, or any other object while slewing in a 360-degree radius unless otherwise recommended by the manufacturer. All signs shall be installed in accordance with the manufacturer's installation instructions.

e. The ballast at the foot of the tower and the ballast hung from the counterweight shall be designed, installed, and maintained so that it can neither move nor fall while the crane is in operation.

f. When the tower is erected within the building structure, the support, vertical shoring and bracing shall be approved by the **STRUCTURAL ENGINEER OF RECORD**.

g. All bolts shall be secured in accordance with manufacturer's project specifications, and shall be inspected 30 days after erection and every 200 working hour thereafter. Results of these inspections shall be sent to the Arlington County Inspection Services Division.

h. Original manufacture parts and anchors stools must be used.

i. The climbing device (i.e., hydraulic jacks or wire rope system) shall be checked before each climb.

2. Safety Devices

All safety devices provided shall be maintained in operable condition always.

a. The trolley shall be equipped with an automatic breaking 50 M.P.H. or manufacturer's specifications.

b. No loads shall be moved over public space unless precautions have been taken to alert pedestrians and vehicular traffic through the use of a flagman or barricades or unless overhead protection is erected over the public space. In any case prior approval of **ARLINGTON COUNTY INSPECTION SERVIES DIVISION** is required.

c. An audible alarm shall be provided to warn of crane movement. The alarm shall be operated from the operator's station.

d. A clearance of eight (8) feet shall be maintained between the bottom of the load and a deck or platform upon which men are working.

e. No crane shall be raised to a new working level while construction personnel are working in the immediate area of the crane.

f. The load line shall be kept in a substantially vertical position at all times.

g. The movement overload device shall be tested periodically in accordance with the manufacturer's specification. All other limit switches shall be checked at the time of erection, and malfunction of any of the above-mentioned shall be reported to the Crane Manufacturer or his Representative.

j. Working condition is restricted to wind speeds up to 30 MPH, unless otherwise required by the crane manufacture. If wind speed is anticipated to exceed 30 MPH, the crane must be set for out of services operation and free to weathervane as recommended by the manufacture.

3. Electrical Equipment

All installations shall comply with Article 610 of the National Electrical Code (NEC).

a. Operator's remote-control system shall be supplied by an isolating transformer.

b. All electrical connections and fixtures exposed to weather shall be of a weatherproof type.

c. All electric control panel doors shall be equipped with switches and shall be locked when crane is working. If any panel doors are opened while the crane is in operation, power to the motor shall shut off automatically.

d. Provision shall be made to prevent the accidental reversing of all motors.

e. Cranes shall be equipped with automatic braking devices to stop all motion except slewing, which shall be stopped by manual device, to permit control in the event of power failures.

f. All electric motors shall be separately equipped with a current-overload-prevention device.

g. All motors, controls, switches, etc., shall be grounded in accordance with applicable sections of the NEC. All flexible power cords or lays shall be in accordance with the applicable sections of the NEC. All exposed metal parts, including pendant controls, shall be effectively grounded in accordance with Article 610.61 of the NEC.

TEMPORARY STANDPIPE EXTENSION

Where required. Buildings four stories or more in height shall be provided with not less than one standpipe for use during construction. Such standpipes shall be installed before the progress of construction reaches 40 feet (12.192 m) in height above the lowest level of fire department vehicle access. Such standpipe shall be provided with fire department hose connections at accessible locations adjacent to usable stairs. Such standpipes shall be extended as construction progresses to within one floor of the highest point of construction having secured decking or flooring.

Buildings being demolished. Where a building is being demolished and a standpipe exists within such a building, such standpipe shall be maintained in an operable condition so as to be available for use by the fire department. Such standpipe shall be demolished with the building but shall not be demolished more than one floor below the floor being demolished.

Detailed requirements. Standpipes shall be installed in accordance with the provisions of Chapter 9 of IBC.

Exception: Standpipes shall be either temporary or permanent in nature, and with or without a water supply, provided that such standpipes systems conform to the requirements of Section 905 of VCC as to capacity, outlets and materials.

Water supply. Water supply for fire protection, either temporary or permanent, shall be made available as soon as combustible material accumulates.

MATERIAL HOISTS USED FOR CONSTRUCTION

The following are some of the common safety and personnel rules applicable for material hoist per the VOSHA requirements.

Separate mechanical permit is required for erection and operation of all material hoists. Equipment and operations must comply with requirements detailed in VOSHA Standard 1926.552.

- Material hoists over 85 feet shall have the hoist structure constructed of non-combustible or fire retardant materials. Cables across working or walking spaces to be protected to prevent tripping.
- Hoist booklet to be kept on the job site.
- Signage is necessary indicating rated load, no riders and operating rules.
- A six (6) foot fence is required around hoist at the ground level.
- Hoist platform gates are required to have positive latching as provided by the manufacturer. It is illegal to modify the latch.
- Fence gates, hoist platform and landing gates are to be closed and latched during operation of the hoist.
- Recommend gates on floors to be hinged or bolted on one end.
- Any welding of tower or platform requires certification.
- Operators are required to remain at lift.
- Communication system required for buildings 50" or higher.

MATERIAL HOISTS

1. Operating rules shall be established and posted at the operator's station of the hoist. Such rules shall include signal system and allowable line speed for various loads. Rules and notices shall be posted on the car frame or crosshead in a conspicuous location, including the statement "NO RIDERS ALLOWED."

2. No person shall be allowed to ride on material hoists except for the purposes of inspection and maintenance.

3. All entrances of the hoist ways shall be protected by substantial gates or bars which shall guard the full width of the landing entrance. All hoist way entrance bars and gates shall be painted with diagonal contrasting colors, such as black and yellow stripes.
   (i) Bars shall be not less than two (2) by four (4) inch wooden bars or the equivalent, located two (2) feet from the hoist way line. Bars shall be located not less than 36 inches nor more than 42 inches above the floor.
   (ii) Gates or bars protecting the entrances to hoist ways shall be equipped with a latching device.

4. Overhead protecting covering of two (2) inch planking, three-fourth (3/4) inch plywood, or other solid material of equivalent strength, shall be provided on the top of every material hoist cage or platform.

5. The operator's station of a hoisting machine shall be provided with overhead protection equivalent to tight planking not less than two (2) inches thick. The support for the overhead protection shall be of equal strength.

6. Hoist towers may be used with or without an enclosure on all sides. However, whichever alternative is chosen, the following applicable conditions shall be met:
   (i) When a hoist tower is enclosed, it shall be enclosed on all sides for its entire height with a screen enclosure of one-half (1/2) inch mesh, No. 18 U.S. gauge wire or equivalent, except for landing access.
   (ii) When a hoist is not enclosed, the hoist platform or car shall be totally enclosed (caged) on all sides for the full height between the floor and the overhead protective covering with one-half (1/2) inch mesh of No. 14 U.S. gauge wire or equivalent. The hoist platform enclosure shall include the required gates for loading and unloading. A six (6) foot high enclosure shall be provided on the unused sides of the hoist tower at ground level.

7. Car arresting devices shall be installed to function in case of rope failure.

8. All material hoist towers shall be designed by a licensed professional engineer.

9. All material hoists shall conform to the requirements of ANSI A 10.5-1969, Safety Requirements for Material Hoists.

PERSONNEL HOIST REQUIREMENTS

- Must comply with requirements detailed in ANSI A10.4 – 1990 and VOSHA Standard 1926.552.

- Separate mechanical permit required for erection and operation of all personnel hoists.

- Full load test required before hoist is put into service after each move and erection and each 90 days while in use. This test will be witnessed by the Elevator Inspector.

- General Requirements:

  1. Hoist towers outside the structure shall be enclosed for the full height on the side or sides used for entrance and exit to the structure. At the lowest landing, the enclosure on the sides not used for exit or entrance to the structure shall be enclosed to a height of at least (10) feet. Other sides of the tower adjacent to floors or scaffold platforms shall be enclosed to a height of ten (10) feet above the level of such floors or scaffolds.

  2. Towers inside of structures shall be enclosed on all four sides throughout the full height.

  3. Towers shall be anchored to the structure at intervals not exceeding 25 feet. In addition to tie-ins, a series of guys shall be installed. Where tie-ins are not practical, the tower shall be anchored by means of guys made of wire rope at least one-half (1/2) inch in diameter, securely fastened to anchorage to ensure stability.

  4. Hoist way doors or gates shall be not less than six (6) feet, six (6) inches high and shall be provided with mechanical locks which cannot be operated from the landing side, and shall be accessible only to persons on the car.

5. Cars shall be permanently enclosed on all sides and the top, except sides used for entrance and exit which have car gates or doors.

6. A door or gate shall be provided at each entrance to the car which shall protect the full width and height of the car entrance opening.

7. Overhead protective covering of two (2) inch planking, three-fourth (3/4) inch plywood or other solid material or equivalent strength shall be provided on the top of every personnel hoist.

8. Doors or gates shall be provided with electric contacts which do not allow movement of the hoist when door or gate is open.

9. Safeties shall be capable of stopping and holding the car and rated load when traveling at governor tripping speed.

10. Cars shall be provided with a capacity and data plate secured in a conspicuous place on the car or cross head.

11. Internal combustion engines shall not be permitted for direct drive.

12. Normal and final terminal stopping devices shall be provided.

13. An emergency stop switch shall be provided in the car and marked "Stop"

14. Ropes:

    (i) The minimum number of hoisting ropes used shall be three (3) for traction hoists and two (2) for drum-type hoists.

    (ii) The minimum diameter of hoisting and counterweight wire ropes shall be one-half (1/2) inch.

TEMPORARY USE OF ELEVATOR FOR CONSTRUCTION PURPOSES IN SINGLE AND MULTI-HOISTWAYS

To receive approval of using one (1) or more elevators for construction purposes in a single or multi-hoist way, the contractor/developer shall complete the following work:

1. Elevator cab to be operated at reduced speed or contract speed, i.e., inspection speed, and not available for use by the public.

EXCEPTION: An elevator can be approved at operational speed where the pits hoist way and mechanical rooms are deemed to be safe by the elevator inspector.

2. Each hatchway shall be screened including the elevator pit.

3. Do not need operational the fire service, lobby smoke detectors suppression or emergency generator.

4. All work in the elevator, in the hatchway, elevator pit and pit and elevator machine room to be completed for the requested elevator(s). Exception: Fire Suppression.

5. The elevator machine room to be separated for completion of work by non-elevator trade workers from the operating elevator motors and machinery.
6. All work in the elevator, in the hatchway, elevator pit and pit and elevator machine room to be completed for the requested elevator(s). Exception: Fire Suppression.

7. The elevator machine room to be separated for completion of work by non-elevator trade workers from the operating elevator motors and machinery.

8. Pass inspection for the safeties, door locks, hall buttons, etc.

9. Attendant to be on car at all times when in operation and must be able to speak fluent English.

10. This elevator will not be given a final inspection until all temporary work is completed.

11. Certificate to be renewed every six (6) months or at the discretion of the County for a set time frame. Cost is $100.00 per six (6) months or fraction thereof.

CERTIFICATE OF OCCUPANCY

1. File with Zoning Office at 703-228-3883, Suite 1000, 2100 Clarendon Boulevard for:

   - Master Certificate of Occupancy for entire project and site.
   - Certificate of Occupancy for Core and Shell which includes parking areas.
   - Certificate of Occupancy for office space or dwelling units by floor or units.

2. Zoning Technician – Inspection Services Division, Suite 1000, at 703-228-3800 can answer any questions about filing or scheduling. Minimum filing deadline, one (1) week. Recommend thirty (30) days.

3. Elevator contractor to have elevator inspector check structural installation of elevators immediately after installation. Purpose is to check clearances, beams, shaft and to ensure elevator pit shaft and machine room are free of non-elevator materials and equipment. Building Inspector shall advise elevator inspector when shaft is completed.

4. The general contractor is responsible to ensure all subs, i.e., electrical, mechanical, plumbing and fire are ready and have called to arrange for inspections. All systems are to be pre-tested. The assigned building inspector will coordinate with the general contractor team inspections whenever possible.

5. All fire protection inspections shall be arranged with Inspection Services Division at 703-228-3800 at least two (2) weeks before scheduled test date.

   Tests will include sprinklers, standpipe flow tests and fire pump tests in accordance with NFPA 20. It can take two (2) weeks to conduct alarm and smoke control system tests. All devices connected to fire alarm systems, hood systems and other fire protection systems need to be pre-tested. A simulated generator load test is witnessed by electrical inspectors. Partial inspections of the fire alarm systems will not be made where the system has devices jumped out or indicating trouble, etc. all bugs must be worked out prior to the system inspection.

PRE-TEST BEFORE WE ARRIVE FOR FINAL INSPECTION

6. Permanent street address signs shall be displayed. All mechanical, electrical, fire control, elevator and pump rooms shall also be marked. Building signage per ADA 4.1.2(16) to be installed

7. Fire control room or exterior of building to have Knox box with keys for use by Fire Department. A complete operating manual/chart for all fire protection systems shall be in-place before occupancy. Central supervisory station to be operational where applicable.

8. Each parking space shall be marked with an above grade handicapped parking sign, which includes a notice for the state fine in dollars.

9. When the building is suppressed, sprinklers shall be installed on the floor below and above the floor to be occupied.

10. In all spaces still under construction, the construction workers and work activity shall be physically separated from the public by barriers. Required egress shall be provided with signage to be approved by the Building and Electrical Inspectors.

11. Only approved security systems for egress doors or elevators may be used and shall be approved and inspected by the Inspection Services Division. Permits are necessary unless approved as part of the building permit.

12. Master Certificate of Occupancy shall be released only after all exterior work and site plan conditions set by the County Board are completed.

13. Individual floor, tenant offices or dwelling units will be approved per each CO (Certificate of Occupancy) application after and upon approval of the CO – Core and Shell permit.

REQUIRED INSPECTIONS

INSPECTION	MUST BE MADE AFTER THE FOLLOWING IS COMPLETE	MUST BE MADE BEFORE ANY OF THE FOLLOWING IS STARTED
1. Excavation & Site Preparation, Sedimentation Controls.	General Inspection will be made for erosion and Sedimentation controls.	Before excavating – Noise Ordinance prescribed starting and stopping time for work. M-F 7AM – 9 PM
2. Sewer Tap Inspection Construction Code Inspector (Plumbing) 703-228-3800	At the time the sewer lateral is physically connected to the public sewer. This must be witnessed by an inspector.	Before using the sewer.
3. Footing Inspection Construction Code Inspector (Building) 703-228-3800	After the footing is completely prepared for concrete. See Special Inspections Program. Grade pegs must be in place. All concrete forms must be in place. Reinforcing steel must be in place if required The ground must be tested to insure load bearing capacity for the footing.	Prior to placing concrete in excavation.
4. Building Sewer Inspection Construction Code Inspector (Plumbing) 703-228-3800	After the sewer pipe between the building public sanitary sewer or septic tank is laid. All piping must be pressure tested. The test must be witnessed and approved by an inspector.	Before covering the sewer pipe with earth.
5. Water Service Inspector Construction Code Inspector (Plumbing) 703-228-3800	After the water pipe between the meter, main and the building wall is laid. Water pipe to standpipe	Before the pipe is covered. Often this inspection is made at the same time as the building sewer inspection.

INSPECTION	MUST BE MADE AFTER THE FOLLOWING IS COMPLETE	MUST BE MADE BEFORE ANY OF THE FOLLOWING IS STARTED
6. Ground Work Inspection Construction Code Inspector (Plumbing) 703-228-3800	After all underground sewer and all water pipes beneath a concrete floor slab are installed All piping must be pressured tested. The test must be witnessed and approved by an inspector	Before covering with gravel
7. Slab Inspections Construction Code Inspector (Building) 703-228-3800	The gravel and vapor barrier must be in place. Grade pegs must be installed to establish the finished elevation If drain tile is specified, it must be in place and properly sloped. If slab is elevated, form work and shoring must be in place and inspected, concrete tested and electrical conduit inspected. Structural – Shoring and re-shoring plans must be approved by the County Wall checks plat required for final grade floor Standpipe shall go from basement slab up with building one floor below highest staged floor pour.	Before placing concrete in the slab. After the slab is completely prepared, a reinforcing steel is placed. Allow three (3) days for approval of plans. Before framing for 3rd floor slab, see County Policy on Standpipe Extensions.
8. Wall Inspection Construction Code Inspector (Building) 703-228-3800	Pour Concrete walls. All reinforcing steel is inspected. Block Walls, after parging, waterproofing, installing drain tile and floor framing is in place.	Before installing form and placing concrete. Before back fillings. Submit wall check plat for 1st floor elevation and site location.
9. Elevator Inspections NEIS 3rd party Inspection 1-800-886-6347 Personnel/Material Hoists Construction Code Inspector (Elevator)	Inspect structural for shaft, rails, pit, and machine room. Contact Construction Engineering Supervisor for complete list of specific requirements. Requires permit and plan approval .	Elevator Plan shaft shall be submitted for approval Inspect thirty (30) days prior to schedule occupancy. Prior to using see County Policy. Before building framing inspection is called. Before the use of Personnel/ Material Hoists

INSPECTION	MUST BE MADE AFTER THE FOLLOWING IS COMPLETE	MUST BE MADE BEFORE ANY OF THE FOLLOWING IS STARTED
10. Plumbing/Gas Close-In Waste Pipe and Vents Inspection Water Pipe Inspection and Inside Water Pipe to Fire Pump Plumbing Inspector 703-228-3800	After all waste vents, gas piping, and water pipe that will be enclosed in a wall are installed and tested. All piping must be pressured tested. The test must be witnessed and approved by an inspector	Before drywall insulation is installed.
11. Electrical Service Construction Code Inspector (Electrical) 703-228-3800	After building is watertight. The service must be readily accessible and main service entrance cable must be installed in the panel.	Before the electrical utility provides electric power.
12. Electrical Close-In Inspection Construction Code Inspector (Electrical) 703-228-3800	After all initial wiring is complete. All outlet boxes must be wired and left open. All ground rods must be driven and bonding jumpers installed. Grounds must be made and crimped in boxes.	Before drywall or insulation is installed.
13. Mechanical Close-In Inspections Construction Code Inspector (Mechanical) 703-228-3800	After all duct work is installed Furnace, heat pump or air conditioning unit does not have to be in place.	Before drywall is installed
14. Framing Inspections Construction Code Inspector (Building) 703-228-3800	After all plates are installed and bolted to the foundation walls. After all walls and chases are fire stopped. After all stairways are in place and secured After all sub flooring is installed.	Before drywall is installed.

INSPECTION	MUST BE MADE AFTER THE FOLLOWING IS COMPLETE	MUST BE MADE BEFORE ANY OF THE FOLLOWING IS STARTED
14. Framing Inspections (continued) Elevator Inspectors NEIS (3dr Party) 1-800-886-6347 Fire Protection Inspector 703-228-3800	After the building is weather tight. Both the exterior sheathing and the room must be complete. After electrical, mechanical and plumbing close-in inspections are approved. After check of elevator machine room. Check structural for elevator installation. Contact Elevator Inspector for approval of shop drawings for elevator cab. Contact Fire Protection Inspector for check of Fire Control Room and approval of sprinkler plans and installation.	 Before drywall is installed and after framing inspection. Shall submit sprinkler and Fire Protection equipment plans for approval to Inspection Services Division for review by Fire Protection Engineer.
15. Final Electrical Inspection Construction Code Inspector (Building) 703-228-3800	After all appliances, fixtures, outlets, panels' switches, etc…are installed. After all electrical wiring is complete After emergency generator installed.	Before any equipment, appliance outlets, panel switches, etc… are used. Before final building inspections.
16. Final Plumbing/Gas Inspection Construction Code Inspector (Building) 703-228-3800	After all walls and floors are complete. After all plumbing fixtures and piping are complete and operating properly. After all roughed in plumbing fixtures are capped. Check handicapped requirements.	Before final building inspections.
17. Final Mechanical Construction Code Inspector (Building) 703-228-3800	After all heating, ventilating and air conditioning units/systems are installed and operating properly. After all attics, ducts, basement and craw space insulation is installed.	Before final building inspection.

INSPECTION	MUST BE MADE AFTER THE FOLLOWING IS COMPLETE	MUST BE MADE BEFORE ANY OF THE FOLLOWING IS STARTED
18. Final Building, Fire, Elevator 703-228-3800 Construction Code Inspector 703-228-3800 Elevator Inspector NEIS-1800-886-6347 Fire Protection Inspector 703-228-3800	After all applicable work on the approved plans is complete The structure must be ready for use and occupancy. Check handicapped requirements. Check fire suppression system, fire pump, egress, lights, and alarms. After fire hydrants are operative. Check stairway pressurization, smoke removal systems under emergency power. Check elevators operation and firemen's service.	Before core and shell or tenant Certificate of occupancy Permits are obtained. Before moving into the structure and/or tenant spaces.
19. Master Certificate of Occupancy Construction Code Inspector (Building) 703-228-3800 Environmental Services 703-228-3629	After the structure has passed all required final inspection approvals building, electrical, fire protection, mechanical, plumbing, Environmental Services and Zoning. After the lot is graded, sodding or seeding and landscaping is completed (exception during winger season). After all curb, gutter and sidewalks and trails are complete. After streets and driveways are complete except for a final surface (exception during winter season). After all storm and sanitary sewers serving the lots are complete. After all street name signs are installed. After all site plan conditions are met.	Before release of the Public Works Bond. After all, tenant CO's are issued.

A Master Certificate of Occupancy permit is required to be filed along with a Certificate of Occupancy for the core and shell. Certificate of Occupancy for tenant spaces is required as they are occupied. The Certificate of Occupancy for the core and shell is released upon approval for the common areas. The Master Certificate of Occupancy is released only after all agencies have approved the project, release of public bonds and compliance with all site plan conditions.

CONSTRUCTION SITE TRASH AND DEBRIS REMOVAL

The Department of Environmental Services, Arlington County, enforces the Refuse Ordinance, Chapter 10, Section 10-23.

The ordinance requires construction site to have refuse containers for deposit of workman's trash, as well as regular and routine policing of the site for trash and debris to be placed in refuse container and/or a dumpster with regular disposal on an "as necessary basis."

The enforcement of the new ordinance is to be by the Department of Environmental Services. They will have an inspector checking construction sites and will advise you whenever it is determined that you need to undertake the necessary cleanup activities to be in compliance with the ordinance. Inspection Services staff will also remind you to clean up sloppy construction sites and the adjacent properties of trash and debris associated with your project.

It is our hope and anticipation that you will provide your complete cooperation in complying with the refuse ordinance as you do now in noise, erosion and siltation control measures imposed upon you by other County Ordinances.

MUD AND DUST ON STREETS AND STREET/LANE CLOSINGS

EROSION AND SEDIMENTATION CONTROL

The Department of Environmental Services requires you to have in place erosion and siltation controls as approved by the site engineering plan. You shall maintain the control system throughout the project. Enforcement is by the Department of Environmental Services and Inspection Services will remind you of any problems.

Developers/contractors are required to provide necessary controls to prevent mud and dust from accumulating on streets.

All truck exits must be provided with wash racks or surge stone. Laborers with shovels, hoses and brooms shall be stationed at the exits to remove dirt and dust from vehicles before they enter streets. Where excessive accumulations of dust and mud accumulate in streets, either wash trucks and/or broom vehicles shall be provided to clean streets.

Water supply for wash racks may be from an abandoned meter rack where available or upon applying for a temporary meter with the Water-Sewer Division (Department of Environmental Services).

Where it is necessary to close sidewalks or a street lane, contact Inspection Service Division to arrange for a meeting. Upon submission of a plan outlining the necessary details. These requests will be

reviewed for approval with Traffic Engineering and Environmental Services to determine the necessary rearrangements of pedestrian and vehicle traffic.

USE OF PUBLIC RIGHT-OF-WAY

You are advised that separate permits are required for use of the public right-of-way for construction fences, sidewalk sheds, trailers and storage. The Department of Environmental Services – Traffic Engineering Division shall make the determination if such public space is available for you use for any of these purposes, and if they are available, issue such permits.

PROTECTION OF PEDESTRIANS

Protection required. Pedestrians shall be protected during construction, remodeling and demolition activities as required by the International Building Code.

USE OF A SPACE AS A CONSTRUCTION OFFICE AT BUILDING STILL UNDER CONSTRUCTION

No space shall be utilized as a construction office for building under construction before all structural element has been erected and the final certification letter from SIER and SER as per the special inspection program has been submitted and approved by Arlington County.

APPENDIX A

Statement of special inspection

ARLINGTON COUNTY, VIRGINIA
INSPECTION SERVICES DIVISION
STATEMENT OF SPECIAL INSPECTION

Project Name: _____

Project Address: _____

Permit Number: (A/P): _____

Permit Applicant: _____ **Phone: ( )** _____

Applicant's Address: _____

Owner: _____ **Phone: ( )** _____

Owner's Address: _____

Email: _____

Structural Engineer of Record (SER): _____

Address: _____

License: _____ **Phone: ( )** _____ **email:** _____

Geotechnical Engineer of Record (GER): _____

Address: _____

License: _____ **Phone: ( )** _____ **email:** _____

Special Inspection Engineer of Record (SIER): _____

Address: _____

License: _____ **Phone: ( )** _____ **email:** _____

Testing Agency Engineer (if different from SIER): _____

Address: _____

License: _____ **Phone: ( )** _____ **email:** _____

Precast Concrete Engineer of Record (PER): _____

Address: _____

License: _____ **Phone: ( )** _____ **email:** _____

General Contractor (GC): _____

Address: _____

License: _____ **Phone: ( )** _____ **email:** _____

VERIFICATION AND INSPECTION SCHADULE
FOR STRUCTURAL STEEL

Inspection of Welding	QC (at Mill)		SIER/ SER-Initial	QA (on job site)		SIER & SER-Initial
	Continuous	Periodic		Continuous	Periodic	
Inspection Task Prior to Welding						
Welding procedure specification (WPSs) available	X	-		X	-	
Manufacturer's certificate of welding consumable available	X	-		X	-	
Material identification	-	X		-	X	
Welder identification system	-	X		-	X	
Fit- up of groove welds (include joint geometry) • Joint preparation • Dimensions (alignment, root opening, roof face, bevel) • Cleanliness (condition of steel surfaces) • Tacking (tack weld quality and location) • Backing type and fit (if applicable)	-	X		-	X	
Configuration and finish of access holes	-	X		-	X	
Fit-up of fillet welds • Dimensions (alignment, gaps at root) • Cleanliness (condition of steel surfaces) • Tacking (tack weld quality and location)	-	X		-	X	
Check welding equipment	-	X		-	-	
Inspection Task During Welding						
Use of qualified welders	-	X		-	X	
Control and handling of welding consumables • Packaging • Exposure control	-	X		-	X	
No welding over cracked tack welds	-	X		-	X	
Environmental conditions • Wind speed within limits • Precipitation and temperature	-	X		-	X	

WPS followed • Setting on welding equipment • Travel speed • Selected welding materials • Shielding gas type/flow rate • Preheated applied • Interpass temperature maintained (min/max) • Proper position (F, V, H, OH)	-	**X**		-	**X**	
Welding techniques • Interpass and final cleaning • Each pass within profile limitations • Each pass meets quality requirement	-	**X**		-	**X**	
Inspection Task After Welding						
Welds Cleaned	-	**X**		-	**X**	
Size, length and location of welds	**X**	-		**X**	-	
Welds meet visual acceptance criteria • Crack prohibition • Weld/base-meal fusion • Crater cross section • Weld profiles • Weld Size • Undercut • Proosity	**X**	-		**X**	-	
Arc strikes	**X**	-		**X**	-	
K-area	**X**	-		**X**	-	
Backing removed and weld tabs removed (if required)	**X**	-		**X**	-	
Repair activities	**X**	-		**X**	-	
Document acceptance or rejection of welded joint or member.	**X**	-		**X**	-	

Owner Signature: SER Signature: SIER Signature:

Inspection of High-Strength Bolting	QC (at Mill)		SIER/ SER-Initial	QA (on job site)		SIER& SER-Initial
	Continuous	Periodic		Continuous	Periodic	
Inspection Task Prior to Bolting						
Manufacturer's certification available for fastener material	-	X		X	-	
Fasteners marked in according with ASTM requirement	-	X		-	X	
Proper fasteners selected for the joint detail(grade, type, bolt length if threads are to be excluded from shear plane)	-	X		-	X	
Proper bolting procedure selected for joint detail	-	X		-	X	
Connecting elements, including the appropriate faying surface condition and the preparation, if specified, meet applicable requirement.	-	X		-	X	
Pre-installation verification testing by installation personal observed and documented for fastener assemblies and methods used.	X	-		-	X	
Proper storage provide for bolts, nuts, washers and other fastener components	-	X		-	X	
Inspection Task During Bolting						
Fasteners assemblies, of suitable condition, placed in all holes and washers (if required) are positioned as required	-	X		-	X	
Joint brought to the snug-tight condition prior to the pretensioning operation	-	X		-	X	
Fasteners component not turned by the wrench prevented from rotating	-	X		-	X	
Fasteners are pretension in according with the RCSC Specification, progressing systematically from the most rigid point toward the free edges.	-	X		-	X	
Inspection Task After Bolting						
Document acceptance or rejection of bolted connection	-	X		-	X	

Owner Signature: SER Signature: SIER Signature:

Inspection of Steel Element of Composite Construction Prior to Concrete Placement	QC (at Mill)		SIER/ SER- Initial	QA (on job site)		SIER& SER- Initial
	Continuous	Periodic		Continuous	Periodic	
Placement and installation of steel deck	X	-		X	-	
Placement and installation of steel headed stud anchors	X	-		X	-	
Document acceptance or rejection of steel element	X	-		X	-	

VERIFICATION AND INSPECTION SCHADULE OF STEEL CONSTRUCTION OTHER THAN STRUCTURAL STEEL

Non- Structural Steel	Continuous	Periodic	Referenced Standard	SIER& SER- Initial
1- Material verification of cold-formed steel deck:				
a. Identification marking to conform to ASTM standards specified in the approved construction documents.	-	X	Applicable ASTM material standards	
b. Manufacturer's certificate test reports	-	X	-	
2- Inspection of welding:				
a..Cold form steel deck:				
1) Floor and roof deck weld.	-	X	AWS D1.3	
b.reinforcement steel:	-			
1). Verification of weldability of reinforcement steel other than ASTM A 706		X	AWS D1.4 ACI 318: Section 3.5.2	
2) Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames, and boundary elements of special structural walls of concrete shear reinforcement	X	-		
3). Shear reinforcement	X			
4). Other reinforcement steel	-	X		

Owner Signature: SER Signature: SIER Signature:

VERIFICATION AND INSPECTION SCHADULE
FOR STRUCTURAL STEEL
Seismic requirement

Inspection of Welding	QC (at Mill)		SIER/ SER- Initial	QA (on job site)		SIER& SER- Initial
	Continuous	Periodic		Continuous	Periodic	
Inspection Task Prior to Welding						
Material identification	-	X		-	X	
Welder identification system	-	X		-	X	
Fit- up of groove welds (include joint geometry) • Joint preparation • Dimensions (alignment, root opening, roof face, bevel) • Cleanliness (condition of steel surfaces) • Tacking (tack weld quality and location) • Backing type and fit (if applicable)	-	X		-	X	
Configuration and finish of access holes	-	X		-	X	
Fit-up of fillet welds • Dimensions (alignment, gaps at root) • Cleanliness (condition of steel surfaces) • Tacking (tack weld quality and location)	-	X		-	X	
Inspection Task During Welding						
WPS followed • Setting on welding equipment • Travel speed • Selected welding materials • Shielding gas type/flow rate • Preheated applied • Interpass temperature maintained (min/max) • Proper position (F, V, H, OH) • Intermix of filler metals avoided unless approved	-	X		-	X	
Use of qualified welders	-	X		-	X	
Control and handling of welding consumables • Packaging • Exposure control	-	X		-	X	

Environmental conditions • Wind speed within limits • Precipitation and temperature	-	**X**		-	**X**	
Welding techniques • Interpass and final cleaning • Each pass within profile limitations • Each pass meets quality requirement	-	**X**		-	**X**	
No welding over cracked tack welds	-	**X**		-	**X**	
Inspection Task After Welding						
Welds Cleaned	-	**X**		-	**X**	
Size, length and location of welds	**X**	-		**X**	-	
Welds meet visual acceptance criteria • Crack prohibition • Weld/base-meal fusion • Crater cross section • Weld profiles • Weld Size • Undercut • Proosity	**X** **(DR)**	-		**X** **(DR)**	-	
Placement of reinforcing or contouring fillet welds (if require)	**X** **(DR)**	-		**X** **(DR)**	-	
Backing removed and weld tabs removed (if required)	**X** **(DR)**	-		**X** **(DR)**	-	
Repair activities	**X** **(DR)**	-		**X** **(DR)**	-	

(DR) Documentation Required

Owner Signature: SER Signature: SIER Signature:

Inspection of High Strength Bolting

Inspection of High-Strength Bolting	QC (at Mill)		SIER/ SER-Initial	QA (on job site)		SIER& SER-Initial
	Continuous	Periodic		Continuous	Periodic	
Inspection Task Prior to Bolting						
Manufacturer's certification available for fastener material	**X**			**X**	-	
Fasteners marked in according with ASTM requirement	-	**X**		-	**X**	
Proper fasteners selected for the joint detail(grade, type, bolt length if threads are to be excluded from shear plane)	-	**X**		-	**X**	
Proper bolting procedure selected for joint detail	-	**X**		-	**X**	
Connecting elements, including the appropriate faying surface condition and the preparation, if specified, meet applicable requirement.	-	**X**		-	**X**	
Pre-installation verification testing by installation personal observed and documented for fastener assemblies and methods used.		**X**		-	**X**	
Proper storage provide for bolts, nuts, washers and other fastener components	-	**X**		-	**X**	
Inspection Task During Bolting						
Fasteners assemblies, of suitable condition, placed in all holes and washers (if required) are positioned as required	-	**X**		-	**X**	
Joint brought to the snug-tight condition prior to the pretensioning operation	-	**X**		-	**X**	
Fasteners component not turned by the wrench prevented from rotating	-	**X**		-	**X**	
Fasteners are pretension in according with the RCSC Specification, progressing systematically from the most rigid point toward the free edges.	-	**X**		-	**X**	
Inspection Task After Bolting						
Document acceptance or rejection of bolted connection	-	**X**		-	**X**	

Owner Signature: SER Signature: SIER Signature:

Inspection of Steel Element of Composite Construction Prior to Concrete Placement	QC (at Mill)		SIER/ SER- Initial	QA (on job site)		SIER& SER- Initial
	Continuous	Periodic		Continuous	Periodic	
Placement and installation of steel deck	X	-		X	-	
Placement and installation of steel headed stud anchors	X	-		X	-	
Document acceptance or rejection of steel element	X	-		X	-	

Inspection of High Strength Bolting *with Seismic Requirement*

Inspection of High-Strength Bolting	QC (at Mill)		SIER/ SER- Initial	QA (on job site)		SIER& SER- Initial
	Continuous	Periodic		Continuous	Periodic	
Inspection Task Prior to Bolting						
Proper bolting procedure selected for joint detail	-	X		-	X	
Connecting elements, including the appropriate faying surface condition and the preparation, if specified, meet applicable requirement.	-	X		-	X	
Pre-Installation verification testing by installation personnel observed for fastener assemblies and methods used		X (DR)		-	X (DR)	
Proper storage provide for bolts, nuts, washers and other fastener components	-	X		-	X	
Inspection Task During Bolting						
Fasteners assemblies, of suitable condition, placed in all holes and washers (if required) are positioned as required	-	X		-	X	
Joint brought to the snug-tight condition prior to the pretensioning operation	-	X		-	X	
Fasteners component not turned by the wrench prevented from rotating	-	X		-	X	
Bolts are pretension progressing systematically from the most rigid post toward the free edges	-	X		-	X	
Inspection Task After Bolting						
Document acceptance or rejection of bolted connection	-	X (DR)		-	X (DR)	

Inspection of Steel Element of Composite Construction Prior to Concrete Placement	QC (at Mill)		SIER/ SER-Initial	QA (on job site)		SIER& SER-Initial
	Continuous	Periodic		Continuous	Periodic	
Placement and installation of steel deck	X	-		X	-	
Placement and installation of steel headed stud anchors	X	-		X	-	
Document acceptance or rejection of steel element	X	-		X	-	

Inspection of Cold-Form Steel Construction ***with Seismic Requirement***

Inspection After Welding	Doc Require	QA		SIER & SER-Initial
		Continuous	Periodic	
Verify welds meet visual acceptance criteria • No Cracks • Fusion at toes of weld passes • Crater cross section • Minimum reinforcement of 1/32 inn. For square groove, arc spot and arc seam welds • Undercut < L/8 • Porosity	DR	X	-	
Verify submittal document requirement met for weld: • Location • Size • Length	DR	X	-	
Document acceptance or rejection of steel element -		X	-	

Owner Signature: SER Signature: SIER Signature:

VERIFICATION AND INSPECTION SCHADULE OF STEEL CONSTRUCTION OTHER THAN STRUCTURAL STEEL

Non- Structural Steel	Continuous	Periodic	Referenced Standard	SIER& SER- Initial
1- Material verification of cold-formed steel deck:				
a. Identification marking to conform to ASTM standards specified in the approved construction documents.	-	**X**	Applicable ASTM material standards	
b. Manufacturer's certificate test reports	-	**X**	-	
2- Inspection of welding:				
a..Cold form steel deck:				
1) Floor and roof deck weld.	-	**X**	AWS D1.3	
b.reinforcement steel:	-			
1). Verification of weldability of reinforcement steel other than ASTM A 706		**X**	AWS D1.4 ACI 318: Section 3.5.2	
2) Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames, and boundary elements of special structural walls of concrete shear reinforcement	**X**	-		
3). Shear reinforcement	**X**			
4). Other reinforcement steel	-	**X**		

INSPECTION OF OPEN-WEB STEEL JOISTS AND JOIST GIRDERS

Inspection of open-web steel Joist and girders	Continuous	Periodic	Referenced Standard	SIER& SER- Initial
a. End connection welding or bolted		X	SJI specifications Sec 2207.1	
b. Bridging-Horizontal original (Standard bridging& bridging that differs from the SJI specification listed in section 2207.1)	-	**X**	SJI specifications L Sec 2207.1	

Owner Signature: SER Signature: SIER Signature:

INSPECTION SCHEDULE OF CONCRETE CONSTRUCTION

Concrete	Continuous	Periodic	Referenced Standard	IBC reference	SIER& SER-Initial
1. Inspect of reinforcing steel, including pre-stressing tendons, and placement.	-	**X**	ACI 318CH.20,25.2,25 .3,26.6.1-26.6.3	1908.4	
2. Inspection of bar welding a) Verify weldability of reinforcing bars other than ASTM A706; b) Inspect single-pass fillet welds, maximum 5/16"; and c) Inspect all other welds	-	-	AWS D1.4 ACI 318:26.6.4	-	
3. Inspect of anchors cast in in concrete		**X**	ACI 318:17.8.2	-	
4. Inspection anchors post- installed in hardened concrete members. a) Adhesive anchors installed in horizontally or upwardly inclined orientation to resist sustained tension loads. b) Mechanical anchors and adhesive anchors not defined in 4.a.	-	**X**	ACI 318:17.8.2.4 ACI318:17.8.2		
5. Verifying use of require design mix.	-	**X**	ACI 318: Ch.19,26.4.3, 26.4.4	1904.1., 1904.2, 1908.2, 1908.3	
6. Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content test, and determine the temperature of the concrete.	**X**	-	ASTM C 172 ASTM C 31 ACI 318:26.4, 26.12	1908.10	
7. Inspect concrete and shotcrete placement for proper application techniques	**X**	-	ACI 318: 26.5	1908.6, 1908.7, 1908.8	
8. Verify maintenance of specified curing temperature and techniques.	-	**X**	ACI 318:26.5.3-26.5.5	1908.9	
9. Inspect prestressed concrete for: a. Application of prestressing forces; and b. Grouting of bonded prestressing tendons	**X** **X**	- -	ACI 318: 26.10	-	
10. Inspect erection of precast concrete members.	-	**X**	ACI 318: Ch.26.8	-	
11. Verification of in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs.	-	**X**	ACI 318:26.11.2	-	
12. Inspect formwork for shape, location, and dimension of the concrete member being formed, shoring & reshoring	-	**X**	ACI 318:26.10.1(b)	-	

Owner Signature: SER Signature: SIER Signature:

INSPECTION SCHEDULE OF MASONRY CONSTRUCTION

Masonry Level 1	**Continuous**	**Periodic**	**TMS 402/ACI 530/ACSE 5**	**TMS 602/ACI 530.1/ASCE 6**	**SIER& SER-Initial**
1. Verify compliance with approved submittals	-	**X**	-	Art. 1.5	
2. Verification of f'_m and f'_{AAC} prior to construction except where specifically exempted by this code.	-	**X**	-	Art. 1.4B	
3. Verification of slump flow and VSI as delivered to the site for self-consolidating grout.	**X**	-	-	Art. 1.5B.1.b.3	
4. As masonry construction begins, verify that the following are in compliance:					
a. Proportions of site-prepared mortar.	-	**X**	-	Art. 2.1, 2.6A	
b. Construction of mortar joints.		**X**	-	Art.3.3B	
c. Location of reinforcement, connectors, prestressing tendons and anchorages.		**X**	-	Art.3.4, 3.6A	
d. Prestressing technique.		**X**	-	Art. 3.6B	
e. Grade and size of prestressing tendons and anchorages.		**X**		Art.2.4B,2.4H	
f. Properties of thin-bed mortar for ACC masonry	For 1st 5000 SQF	After the 1st 5000 SQF	-	Art.2.1 C	
5. Verify during construction:					
a. Size and location of structural elements.	-	**X**	-	Art .3.3F	
b. Typed, size and location of anchors, including other detail of anchorage of masonry to structural members, frames to other construction.	-	**X**	Sec. 1.16.4.3,1.17.1	-	
c. Welding of reinforcing bars	**X**		Sec.2.1.7.7.2, 3.3.34(c) 8.3.3.4(b)		

d. Preparation, construction and protection of masonry during cold weather (temperature below 40F) or hot weather (temperature above 90F).	-	**X**	-	Art. 1.8C,1.8D	
e. Application and measurement of prestressing force.	**X**	-	-	Art. 3.6 B	
f. Placement of grout and prestressing grout for bonded tendons is in compliance.	**X**	-	-	Art. 3.5, 3.6 C	
g. Placement of AAC masonry units and construction of thin-bed mortar joints	For 1st 5000 SQF	After the 1st 5000 SQF		Art. 3.3 B.8	
6. Observe preparation of grout specimens, mortar specimens and/or prisms.	-	**X**	-	Art. 1.4 B.2.a.3, 1.4 B.2.b.3, 1.4 B.2.c.3, 1.4 B.3, 1.4 B.4	

Masonry Level 2	**Continuous**	**Periodic**	**TMS 402/ACI 530/ACSE 5**	**TMS 602/ACI 530.1/ASCE 6**	**SIER& SER-Initial**
1. Verify compliance with approved submittals	-	**X**	-	Art. 1.5	
2. Verification of f'_m and f'_{AAC} prior to construction for every 5,000 square feet during construction.	-	**X**	-	Art. 1.4B	
3. Verification of proportions of material in premixed or preblended mortar and grout as delivered to the site.	-	**X**	-	Art. 1.5B	
4. Verification of slump flow and VSI as delivered to the site for self-consolidating grout.	**X**	-	-	Art. 1.5B.1.b.3	
5. Verify the following are in compliance					
a. Proportions of site-mix mortar, grout and prestressing grout for bonded tendons.	-	**X**	-	Art. 2.1, 2.6 A, 2.6 B, 2.6 C, 2.4 G.1.b	
b. Placement of masonry units and construction of mortar joints.	-	**X**	-	Art.3.3B	
c. Placement of reinforcement, connectors, prestressing tendons and anchorages.	-	**X**	Sec.1.16	Art.3.2 E, 3.4, 3.6 A	
d. Grout space prior to grout.	**X**	-	-	Art. 3.2D, 3.2 F	
e. Placement of grout.and prestressing grout for bonded tendons	**X**	-	-	Art.3.5, 3.6 C	
f. Size and location of structural elements.	-	**X**		Art.3.3F	
g. Type, size and location of anchors, including other details of anchorage of	**X**	-	Sec. 1.2.2(e),1. 16.1		

masonry to structural members, frames or others construction.					
h. Welding of reinforcing bars.	**X**	-	Sec. 2.1.9.7.2, 3.3.3.4 (b)	-	
i. Preparation, construction and protection of masonry during cold weather (temperature below 40F) or hot weather (temperature above 90F).	-	**X**	-	Art. 1.8C, 1.8D	
j. Application and measurement of prestressing force.	**X**	-	-	Art. 3.6B	
k. Placement of AAC masonry units and construction of thin-bed mortar joints	**X**	-	-	Art. 3.3 B.8	
l. Properties of thin-bed mortar for AAC masonry	**X**	-	-	Art. 3.3 B.8	
6. Observe preparation of grout specimens, mortar specimens, and/or prisms	**X**	-	-	Art. 1.4 B.2.a.3, 1.4 B.2.b.3, 1.4 B.2.c.3, 1.4 B.3, 1.4 B.4	

Owner Signature: SER Signature: SIER Signature:

Soil	Continuous	Periodic	SIER& SER-Initial
1. Verify materials below shallow foundation are adequate to achieve the design bearing capacity.	-	**X**	
2. Verify excavations are extended to proper depth and have reached proper material.	-	X	
3. Perform classification and testing of compacted fill material.	-	X	
4. Verify use of proper material, densities and lift thicknesses during placement and compaction of compacted fill.	X	-	
5. Prior to placement of compacted fill, observe subgrade and verify that site has been prepared properly.	-	X	

Driven Deep Foundation Elements	Continuous	Periodic	SIER& SER Initial
1. Verify element material, sizes and lengths comply with the requirements.	**X**		
2. Determine capacities of test elements and conduct additional load tests, as required.	**X**		
3. Observe driving operations and maintain complete and accurate records for each element.	X		
4. Verify placement location and plumbness, confirm type and size of hammer, record number of blow per foot of penetration, determine require penetration to achieve design capacity, record tip and butt elevation and document any damage to foundation element.	X		
5. For steel elements, perform additional inspections in accordance with section 1705.2.	-		
6. For concrete element and concrete- filled elements, perform additional inspection in according with section 1705.3.	-		
7. For specially elements, perform additional inspection as determined by the registered design professional in responsible.	-		

Cat-in-place deep foundation elements	Continuous	Periodic	SIER/ SER Initial
8. Inspect drilling operations and maintain complete and accurate records for each element	**X**	-	
9. Verify placement location and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes.	**X**	-	
10. For concrete elements, perform additional inspection in accordance with section 1705.3.	-	-	

Owner Signature: SER Signature: SIER Signature:

Different Scope of Special Inspection.	**Continuous**	**Periodic**	**SIER & SER Initial**
Wall Panels & Veneers	-	**X**	
EIFS	-	X	
Smoke Control System	-	X	
Fabricators	-	X	
Helical piers	**X**	-	
Segmental Retaining Wall a. Reinforced geogrid installation b. Soil compaction c. Segmental wall installation	X	-	
Spray Fire-Resistant Materials a. Structural member surface conditions b. Application c. Thickness **Mastic & Intumescent fire-resistant coating**	- -	X X	
Carbon Fiber (FRD) a. FRD installation b. Pull out test c. Fire resistance membrane application	-	X	
Pre-Cast Concrete	-	X	
Others inspection			

Owner Signature: SER Signature: SIER Signature:

This statement of special inspection is submitted as a condition for permit. It includes a Schedule of Special Inspections applicable to this project. The SI shall keep records of specified inspections and testing. The SI shall furnish specified inspection and test reports to the County building official, and to the registered design professionals of record, as appropriate. All discrepancies shall be brought to the attention of the contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the code official and to the registered design professionals of record, as appropriate. Interim reports shall be submitted as required by the special inspection program manual. A Final Report of Special Inspections documenting completion of all required special inspections and correction of documented discrepancies shall be submitted prior to the issuance of an occupancy permit. By signing the SSI, you also affirm that you understand and will comply with the County requirements for Special inspections as outlined in the "SSI", "Special Inspection Program Manual", and the "Building Code".

Owner:

Type or print name **Date**

Signature

Structural Engineer of Record (SER):

Type or print name **Date**

Signature

Geotechnical Engineer of Record (GER):

Type or print name **Date**

Signature

Precast Concrete Engineer of Record (PER):

Type or print name **Date**

Signature

Special Inspection Engineer of Record (SIER):

Type or print name **Date**

Signature

Testing Agency Engineer of Record (if different from SIER):

Type or print name **Date**

Signature

General Contractor (GC):

Type or print name **Date**

Signature

County Code Official's Acceptance:

Type or print name **Date**

Signature

APPENDIX B

Statement of special inspection for sheeting and shoring

ARLINGTON COUNTY, VIRGINIA
INSPECTION SERVICES DIVISION
STATEMENT OF SPECIAL INSPECTION SHEETING& SHORING

Project Name: _____

Project Address: _____

Permit Number: (A/P): _____

Permit Applicant: _____ **Phone: (____)** _____

Applicant's Address: _____

Owner: _____ **Phone: (____)** _____

Owner's Address: _____

Email: _____

Structural Engineer of Record (SER): _____

Address: _____

License: _____ **Phone: (____)** _____ **email:** _____

Geotechnical Engineer of Record (GER): _____

Address: _____

License: _____ **Phone: (____)** _____ **email:** _____

Special Inspection Engineer of Record (SIER): _____

Address: _____

License: _____ **Phone: (____)** _____ **email:** _____

Testing Agency Engineer (if different from SIER): _____

Address: _____

License: _____ **Phone: (____)** _____ **email:** _____

Precast Concrete Engineer of Record (PER): _____

Address: _____

License: _____ **Phone: (____)** _____ **email:** _____

General Contractor (GC): _____

Address: _____

License: _____ **Phone: (____)** _____ **email:** _____

VERIFICATION AND INSPECTION SCHADULE

SHEETING & SHORING	EXTENT OF SERVICES	SIER&SER INITIAL
1.Pile/Soldier beam Installation a. Steel used for soldier beams-Mill certifications specified	a Verify material conforms to Construction documents.	
b. Drilling soldiers piles	b. Inspect depth of bottom of hole as well as backfilling operation.	
c. Pile size, location and pumbness	c. Verify correct material is used per the construction documents & members are placed in the correct locations & their orientation and plumbness are correct	
2. Lagging a. Material	a. Visually inspect lagging for size, location & condition	
3. Tieback installation a. Drilling	a. visually inspects tieback installation to verify size, length, number of strand, elevation 7 angle of declination.	
b. Material	b. Verify tieback free, bond, and tail lengths conform to the construction documents.	
c. Grout	c. Inspect grouting of tieback and take samples if require by specification.	
4. Tieback Testing a. Hydraulic Jacks	a. Verify all hydraulic jacks have current calibrations and that the gauge is calibrated in the appropriate increments.	
b. Testing Procedures	b. Continuously inspect the contractor's proof or performance test.	
c. Lock off	c. Continuously verify that the lock off loads is consistent with the construction documents.	
d. Test Sheets	d. Review all tieback proof and performance test sheets.	

5. Bracing Members a. Member size & location b. Welds	 a. Verify material and location conforms to the construction documents. b. periodic inspection of all welds.	
6. Monitoring	Verify that results obtained by monitoring contractor are in according with the contingency plan and below the threshold value that was established for the project as per the approved construction documents. Frequency of monitoring shall be at least twice a week.	
7. Crack Monitoring	Periodically, the perimeter of the job should be walked to look for out of the ordinary condition such as cracks in the street or sidewalks, settlement of soil along adjacent building, non-level lagging board, that may indicate undue stress in the system,	
8. Inclinometers		
9A. Underpinning Installation a. Pit Bottom b. Bearing Capacity c. Concrete d. Depth and plumbness 9B.Pit Boards a. Material	 a. Visually Inspect the bottom of the pits to make sure they are free of loose material b. Test bottom of bit for bearing capacity required by construction documents. c. Inspect installation of pit concrete and take samples if required by specification d. Periodically check the pits for depth and plumbness. Visually inspect material for size and condition.	
Other		

Owner Signature: SER Signature: SIER Signature:

This statement of special inspection is submitted as a condition for permit. It includes a Schedule of Special Inspections applicable to this project. The SI shall keep records of specified inspections and testing. The SI shall furnish specified inspection and test reports to the County building official, and to the registered design professionals of record, as appropriate. All discrepancies shall be brought to the attention of the contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the code official and to the registered design professionals of record, as appropriate. Interim reports shall be submitted as required by the special inspection program manual. A Final Report of Special Inspections documenting completion of all required special inspections and correction of documented discrepancies shall be submitted prior to the issuance of an occupancy permit. By signing the SSI, you also affirm that you understand and will comply with the County requirements for Special inspections as outlined in the "SSI", "Special Inspection Program Manual", and the "Building Code".

Owner:

Type or print name **Date**

Signature

Structural Engineer of Record (SER):

Type or print name **Date**

Signature

Geotechnical Engineer of Record (GER):

Type or print name **Date**

Signature

Special Inspection Engineer of Record (SIER):

Type or print name **Date**

Signature

Testing Agency Engineer of Record (if different from SIER):

Type or print name **Date**

Signature

General Contractor (GC):

Type or print name **Date**

Signature

County Code Official's Acceptance:

Type or print name **Date**

Signature

APPENDIX C

- **Approved stamp requirement**
- **Concrete cold weather temp log**
- **Stripping/stressing authorization request**

APPROVAL FOR GENERAL COMPLIANCE WITH STRUCTURAL CONSTRUCTION DOCUMENTS	
( ) APPROVED	Fabrication may proceed as shown.
( ) APPROVED AS CORRECTED	Fabrication may proceed as based on corrections indicated.
( ) APPROVED AS CORRECTED RESUBMIT FILE COPY	Fabrication may proceed as based on corrections indicated. Correct submission and resubmit for record purpose only
( ) DISAPPROVED	Fabrication may not proceed. Correct submission for further review.
( ) REVIEWED FOR INFORMATION	Approval not require Accepted for information purposed only.
Approval is for general compliance with the structural contract documents only. This approval assumes no responsibility for dimension, quantities and condition that pertain to fabrication and installation or for processes and Techniques of construction. The Contractor is responsible for coordination of the work of all trades and the performance of this work in a safe and satisfactory manner.	
BY _____ **DATE**_____	(**Company)**

APPROVAL FOR DESIGN CONFORMITY

( ) APPROVED	Construction may proceed as shown.
( ) APPROVED AS NOTD	Construction may proceed based on correction indicated.
( ) REVIS AS NOTED & RESUBMIT	Construction may proceed based on correction indicated. Resubmit corrected submission for record purpose
( ) REJECTED) / RESUBMIT AS SPECIFIED	Construction may not proceed. Correct submission for further review.
( ) **FURNISH** ( ) **CORRECTED COPIES**	Approval not required. Accepted for information purposed only

Notations do not authorize changes to contact sum.
Submittal was received for design conformity and general conformance to contract document only.
The contractor is responsible for confirming and correlating dimensions at job sites for tolerances, clearances, quantities, fabrication processes and techniques of construction, coordination of his work with other trades full compliance with contract document.

DATE _____	**BY _____**	**(Company)**

APPROVAL FOR DESIGN CONFORMITY

( ) APPROVED	Final approval. Fabrication may proceed on work as shown.
( ) APPROVED AS NOTD	Fabrication may proceed on the basis of correction indicated.
( ) DISAPPROVED	Fabrication may not proceed. Revision shall be made and Submitted for further check

Approval is only for conformance with the design concept of the project and compliance with the information given in the contract documents. The contractor is responsible for dimensions to be confirmed and correlated at the job sites, for information that pertains solely to the fabrication processes or to techniques of construction, and for the condition of the work of all trades.

BY_____
DATE_____

(Company)

Cold Weather Concrete Slab Temperature Log

Pour Date :	**Project Name:**						**Date:**
Start Time:	**Pour Section:**						**Permit #**
Finish Time:	Station # 1	Station # 2	Station # 3	Station # 4	Air temp Under Slab	Ambient Air-temp	Remarks
Day 1 12 a.m.							
4 a.m.							
8 a.m.							
12 p.m.							
4 p.m.							
8 p.m.							
Day 2 12 a.m.							
4 a.m.							
8 a.m.							
12 p.m.							
4 p.m.							
8 p.m.							
Day 3 12 a.m.							
4 a.m.							
8 a.m.							
12 p.m.							
4 p.m.							
8 p.m.							
Day 4 12 a.m.							
4 a.m.							
8 a.m.							
12 p.m.							
4 p.m.							
8 p.m.							
Station shall be located at the four corner of the pour near to the edge							

Arlington County Stripping/Stressing Authorization Request

Date:

PROJECT DATA:

Permit No. _____ Job No._____
Name: _____ General Contractor_____
Address: _____ Concrete Contractor_____

POUR DATA:

Mix Designation _____ Strength (psi)_____
Date & Time _____ Volume (cy) _____
Location_____
_____

STRIPPING DATA:	Design /Required	Actual	Sat./Unsat
Age (days)	_____	_____	_____
Avg Temp	_____	_____	_____
Con Strength (psi)	_____	_____	_____

Note: Stripping can NOT proceed until the tendon elongation are reviewed and approved by the SER

ATTACHMENTS:

Key Plan
Concrete strength record
Stressing Record
Temperature Log

NOTES: _____
_____

Special inspection Engineer of record Signature & Seal

Structural engineer of record signature & Seal

APPENDIX D

Sample of The Pre-Construction Meeting Minutes

Project Name: **Address:**	
Meeting Purpose:	*Pre-Construction & Special Inspection Meeting*
Meeting Date:	
Meeting Time:	
Meeting Location:	*Training Room, 10th Floor, 2100 Clarendon Blvd*
Meeting Facilitator:	*Emad Elmagraby, Field Service Section Chief*
Attendees:	*Sign Sheet Attached*
Minutes Issued By:	*Emad Elmagraby*

Next Steps: (Task, Assigned to, Checkpoint Date)	**Owner**	**Due Date**
Scheduling General Building Inspection once a week	*GC*	*open*
Following Minutes shall be forward to appropriate Sub-Contractors when they joint the construction team	*GC*	*open*

Decisions Made: (What, Why, Impacts)

1. *DAS system*
   - *Inspected by a 3rd party, sign and seal letter shall be submitted*
2. *Pre-CO meeting*
   - *This meeting shall be schedule prior occupancy*

Discussion: (Items/Knowledge Shared)

Special inspection Requirement.

- *County structural engineer will conduct an un-announce periodic site visits to the project during construction.*
- *SSI and resume for SIER & Field Technician shall be submitted for review*
- *Solider pile and tie back installation & stressing shall be inspected as per SSI*
- *Monitoring of the SOE shall be twice a week till grade level*
- *Copy of the approved concrete mix design sealed by the design engineer and approved by the SER shall be emailed to the County*
- *Waiver letter from SER shall be submitted for non-PT slab*
- *Form Stripping shall be done after the field cured concrete break results reach 75% or 3000 psi minimum. No stripping shall be done prior to that. No early breaks, early stripping, or phone calls are allowed. Any deviation from this and Arlington County will require to approve any future stripping letter in addition to the SER and SIER*
- *PT stripping letter shall be sign and sealed from both SIER, SER*
- *Field Cure Cylinder shall be stored at the same place concrete been pouring.*
- *Low break is a deficiency and shall be add to the No-Compliance list*
- *Change to the structure plans that required revision*
- *Special inspection requirement is covered by IBC chapter 17 and AC special inspection& pre-construction manual*
- *Temperature Loge for cold weather (see AC Manual)*
- *All report shall be submitted within five business days, deficiency reports within three days*

Discussion: (Items/Knowledge Shared)

- *Windsor probe test is NOT acceptable by Arlington County, only a core test or a calculation from the SER.*
- *Definition and inspection for periodic and full time inspection as mention at chapter 17 IBC for Concrete, CMU, stressing cable…. etc.*
- *Non-Compliance list shall be submitted weekly and all items shall be resolved ASAP*
- *Water proofing inspection Shall be done by the SIER*
- *Steel Erector Certification issued by AISC shall be submitted prior installation*
- *Light gage metal inspection (see building)*
- *Brick Façade, precast facade inspection y SIER*
- *Approved shop drawing Shall be sign and sealed by the design engineer and seal stamped approved by the SER (no-exception taken is not acceptable)*
- *Final report of SIER, SER, PER, GER (AC manual pages 12-16) shall be submit prior to get building final*
- *Final letter for tower crane shall be submitted ASAP*
- *Tower Crane; All bolts shall be secured in accordance with manufacturer's project specifications, and shall be inspected 30 days after erection and every 200 working hour thereafter. Results of these inspections shall be sent to the Arlington County Inspection Services Division.*
- *Tower Crane working condition are restricted to wind speeds up to 45 MPH, if wind speed is anticipated to exceed 45 MPH, the crane must be set for out of services operation and free to weathervane as recommended by the manufacture.*
- *Carbon Fiber installation shall require a permit, also an approved fire membrane shall be installed to the FRP and permitted as well*
- *At Extreme weather condition, GC shall adhere to AC requirement*

Building Inspection Requirement

- *Schedule one general inspection weekly when you start pouring concrete*
- *The following will require building permits: footing to grade, full building, Tower Crane, Cover walk way, all trailers, construction office at the building, Man and Material hoist (Elevator permit).*
- *NO Construction above grade is permitted without above grade permit (including rebar and/or form for column or slab).*
- *Approved plans/revision shall be kept on site*
- *A pre-Co meeting shall be schedule with ISD prior occupancy*
- *Wood framing and Cold form steel inspection shall be performed by the county*
- *Roof and Floor trusses sign and seal drawing shall be submitted for review (for Wood Frame Construction Only)*
- *Rough in Mechanical shall installed and inspected prior to constructing the associated shaft*
- *Standpipe shall be installed when the progress of construction not more than 40 feet in height above the lowest level of FD vehicle access, such standpipe shall be extended as construction progress to within one floor of the highest point of construction having secured decking or flooring.*
- *General inspection shall be schedule prior to constructing any fire rated assembly*

Discussion: (Items/Knowledge Shared)

- *Detail for fire rated listed assembly shall be available prior to inspection*

Fire Inspection Requirement

- *The whole system which include Fire alarm, sprinkler systems, elevator, smoke control (if exist) and annunciator panel shall be tested in whole as a complete system, System shall be 100% pretested prior inspection.*
- *Annunciator Panel shall be installed prior to pretesting the whole system.*
- *Sprinkler, elevator, mechanical and fire representative shall be present at the job site during testing of the equipment since it works as an interconnected system, missing any representative will result in canceling and rescheduling the inspection/test.*
- *Fire inspection shall be schedule in advance by phone (703-228-3846).*
- *Permit holder shall be the sole person to schedule inspections.*
- *Fire Alarm Final test shall be inspected with canned smoke and panel must be green.*
- *Fire pump test shall be approved prior to fire alarm inspection.*
- *System shall be pre-tested prior inspection, if you are not ready for inspection then you will be rejected.*
- *Area smoke detector shall have verification.*
- *Duct detector and return air plenum shall not be verified but shall be alarm devices.*
- *Pull station location shall be installed a max of 5' from exit door, the operating handle of the pull station shall not be higher than 48" above finish floor.*
- *Clear part of wall mounted strobe lens shall be installed 80" and 96" above finish floor to bottom of lens.*
- *Manual switches for fan control in fire control room shall override all auto functions.*
- *Tamper switches shall annunciate the exacted location of the valve.*
- *Flow switches shall annunciate all zones they serve and associated floor.*
- *Dry pipe valves shall provide water to inspector test within 60 seconds.*
- *Stair pressure shall be between 0.10 and 0.35 Inches of water during testing, to perform the test GC shall assign personnel to make sure that all stairs doors are closed at all time during testing.*
- *Temporary standpipe & Siamese shall be installed upon framing of the 3rd floor, GC shall schedule a meeting with ISD fire inspector in order to coordinate the location of the Temporary standpipe and the Siamese prior to installation.*
- *All floor designation shall match throughout the building i.e., Elevators, Fire Alarm system, stair signage.*
- *Knox box for high rise building shall be installed next to the exterior door of the fire control room, the box shall contain two keys, one for the fire control room door and the second one for the key box that is located inside the room. The key box shall contain 15 sets of keys for the following: general building master, elevators key, key cards, fire alarm reset key.*

Discussion: (Items/Knowledge Shared)

- *Knox box for Mid-rise building shall be located outside of the main building entry door and shall include 7 sets of keys for the following: general building master, elevators key, key cards, fire alarm reset key.*

Electrical Inspection Requirement

- *DAS system shall be inspected by a 3rd party, a signed and sealed letter shall be submitted prior final inspection (Attached a copy of the certification letter)*
- *Temporary generators shall be permitted and inspected prior using it.*
- *Device extension rings shall be installed in combustible material.*
- *Fire pumps and controllers shall be installed as per manufacturer's instructions and building code (where the cable go? from the top? Bottom? Side?)*
- *Emergency generators shall be installed correctly. (circuit breaker monitoring, circuit breaker labeling, start up and transfer time, day tank power and disconnect, ventilation systems interconnected in enclosed rooms)*
- *Building grounding electrode system shall be installed correctly.*
- *Ceiling grid system shall NOT be used as electrical equipment supports.*
- *Ceiling tiles shall NOT be used for supports of devices.*
- *Load side of transformers shall be bonded correctly.*
- *Boxes for emergency and fire alarm circuits shall be identified and labeled.*
- *Panel schedules shall indicate the locations for loads served.*
- *Transformers shall be secured to the structure.*
- *Emergency and normal power circuits shall be installed in Different raceway.*
- *Required clear working clearance shall be maintained in front of equipment's and VAV's).*
- *Transfer time from normal to emergency power (emergency generator, fire pump and life safty equipment's) should NOT exceed 10 second.*
- *Service shall be inspected prior to Dominion Power energizing it.*
- *Follow Dominion Power manual instruction (Blue Book).*
- *Circuit integrity cable shall be installed as per electrical code and reference standers (Fire rated assembly)*

Pluming Inspection Requirement

- *Swimming Pool installation shall be as per ISPSC*

Mechanical Inspection Requirement

- *Rough in Mechanical shall perform prior to constructing the associated shaft*
- *Grease duct*
- *Plenum ceilings*
- *Equipment*
- *Piping*
- *Fire dampers*

Discussion: (Items/Knowledge Shared)

- *Duct*
- *Site*

Energy Inspections

- *County energy inspectors will make periodic site visits to inspect the building during various stages of construction*
- *Contractors shall schedule energy inspection directly with Linda Baskerville (703-475-8541/ 703-228-3991) and/or Mike Hamilton (703-244-0479/703-228-3855)*
- *Inspection shall be schedule when you reach the following construction milestones dates (inspection criteria are listed in parentheses):*
  - *When insulation has been installed and is visible for below-grade areas, such as sub-slab insulation (R-values & extent).*
  - *When windows and doors are on-site but not yet installed (U-factors, SHGC, air infiltration).*
  - *When the air barrier installation commences and is visible; and completed (air barrier presence & completeness).*
  - *When the project is ready for the framing inspection and the project has installed air barriers as well as building thermal envelope insulation, including roof insulation (Insul R-values & non-compressed batt & completeness of installation).*
  - *When ductwork has been installed and is visible (sealing, and insulation R-value and extent where required).*
  - *When the mechanical equipment is onsite or has been installed (efficiency ratings, or model & serial #)*
  - *When the light fixtures and bulbs have been installed and are functioning (rough count & wattage compliance).*
  - *When the occupancy sensors have been installed and are functioning (presence & functional 30 minute test if not commissioned)*
  - *When the testing and balancing of the project has been completed (commissioning documentation).*

SECTION 01 42 00 - REFERENCES

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 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. Reviewed: The term "reviewed" where used in conjunction with the Engineer's action on the Contractor's submittals, applications, and requests, is limited to the Engineer's duties and responsibilities as stated in the Conditions of the Contract.

F. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

G. Recycled Content Materials: Building materials that contain in aggregate, a minimum weighted average of post consumer or post industrial recycled content material.

H. Post Industrial Recycled Content: Building material generated by collection of waste material or by products of the manufacturing process.

I. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

J. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

K. Installer: An "Installer" is the Contractor or an entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1. The term "experienced," when used with the term "Installer," means a person regularly engaged in this type of work, being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.
2. Trades: Use of titles such as "carpentry" is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.
3. Assignment of Specialists: Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in the operations to be performed. The specialists must be engaged for those activities, and

assignments are requirements over which the Contractor has no choice or option. Nevertheless, the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.

a. This requirement shall not be interpreted to conflict with enforcement of building codes and similar regulations governing the Work. It is also not intended to interfere with local trade union jurisdictional settlements and similar conventions.

L. "Provide": Furnish and install, complete and ready for the intended use.

M. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

N. Testing Laboratories: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.3 SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 50 Division format and MASTERFORMAT numbering system.

B. Specification Content: This Specification uses certain conventions in the use of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:

1. Abbreviated Language: Language used in Specifications and other Contract Documents is the abbreviated type. Words and meanings shall be interpreted as appropriate. Words that are implied, but not stated shall be interpolated as the sense required. Singular words will be interpreted as plural and plural words interpreted as singular where applicable and the context of the Contract Documents so indicates.
2. Imperative and streamlined language is used generally in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the text, for clarity, subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.
   a. The words "shall be" shall be included by inference wherever a colon (:) is used within a sentence or phrase.

1.4 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Conflicting Requirements: Where compliance with two or more standards is specified, and the standards may establish different or conflicting requirements for minimum quantities or quality levels. Refer requirements that are different, but apparently equal, and uncertainties to the Engineer for a decision before proceeding.

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. In complying with these requirements, indicated numeric values are

minimum or maximum, as appropriate for the context of the requirements. Refer uncertainties to the Engineer for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
   1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.5 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
   1. ICC - International Code Council; www.iccsafe.org.

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.
   1. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
   2. DOE - Department of Energy; www.energy.gov.
   3. EPA - Environmental Protection Agency; www.epa.gov.
   4. OSHA - Occupational Safety & Health Administration; www.osha.gov.
   5. SD - Department of State; www.state.gov.
   6. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.

1.6 GOVERNING REGULATIONS/AUTHORITIES

A. The Engineer has contacted authorities having jurisdiction where necessary to obtain information necessary for preparation of Contract Documents. Contact authorities having jurisdiction directly for information and decisions having a bearing on the Work.

B. Copies of Regulations: Obtain copies of the following regulations and retain at the Project Site, available for reference by parties who have a reasonable need for such reference.

C. International Building Code - 2015.
   1. Current list of codes in use by Arlington County:
      a. ICC International Building Code/2015
      b. NFPA National Electrical Code/2014
      c. ICC International Mechanical Code/2015
      d. ICC International Fuel Gas Code/2015
      e. ICC International Plumbing Code/2015
      f. NFPA-72/13
      g. NFPA-13/13
      h. ICC/ANSI A117.1/2009
      i. ICC International Energy Conservation Code/2015
      j. ICC International Property Maintenance Code/2015

2. Verify current codes and standards in use by Arlington County at the following site: https://building.arlingtonva.us/codes-ordinances/building/standards/.

D. VA Uniform Statewide Building Code - VUSBC 2015

F. Americans with Disabilities Act Accessibility Guidelines (ADAAG)
1. Available from the Organization - https://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards/background/adaag .

1.7 SUBMITTALS

A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

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 requirements for temporary utilities, support facilities, and security and protection facilities. In addition to the specifications contained herein, Work shall be performed in accordance with the Arlington County Department of Parks & Recreation Design Standards for Tree Protection and Trimming as shown on plans and available online at:
   1. http://parks.arlingtonva.us/design-standards/

B. Applicable Regulations
   1. Erosion and Sediment Control (Chapter 57 of the Arlington County Code)
   2. Utilities (Chapter 26 of the Arlington County Code)
   3. Stormwater Management (Chapter 60 of the Arlington County Code)
   4. Chesapeake Bay Preservation Ordinance (Chapter 61 of the Arlington County Code)
   5. Trees and Shrubs (Chapter 67 of the Arlington County Code)
   6. Virginia State Water Control Board Regulations

C. Applicable References
   1. Virginia Erosion and Sediment Control Handbook
   2. Arlington County Stormwater Management Ordinance Guidance Manual
   3. Arlington County Planning Guide to Erosion and Sediment Control
   4. Arlington County Pre-Storm Erosion and Sediment Control Checklist
   5. Arlington County Planning & Field Guide for Pollution Prevention (P2)
   6. Arlington County Tree Protection and Planting Standards

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Project Engineer, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Owner will pay sewer-service use charges for sewer usage by all entities for construction operations with the exception of exterior restroom facilities for the Contractor's team.

C. Water Service: Owner will pay water-service use charges for water used by all entities for construction operations with the exception of exterior restroom facilities for the Contractor's team.

D. Electric Power Service: Owner will pay electric-power-service use charges for electricity used by all entities for construction operations.

E. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

F. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
   1. Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
   2. Connect temporary service to the existing power source, as directed by the CM.

1.4 INFORMATIONAL SUBMITTALS

A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.

C. Stormwater Pollution Prevention Plan (SWPPP): Required for any activity that disturbs greater than or equal to 2500 square feet per the requirements of Arlington County Code Chapter 60. This plan contains the following elements:
   1. Erosion and Sediment (E&S) Control Plan
   2. Pollution Prevention Plan (P2 Plan)
   3. Stormwater Management Plan (SWMP)
   4. Virginia Stormwater Management Program (VSMP) Requirements where applicable

D. Where work is governed by an approved SWPPP, the Contractor shall be responsible for all SWPPP self-inspection and documentation requirements. Where work is governed by an approved SWPPP, the Contractor shall be responsible for all SWPPP self-inspection and documentation requirements which includes but is not limited to the following:
   1. A SWPPP box is installed and maintained at project site.
   2. Permit(s) and applicable documentation are posted near the SWPPP box.
   3. All sections of the SWPPP are kept complete and up to date throughout the duration of the project. (For example, notation of when erosion and sediment controls (ESC) are installed and information about the types of pollution prevention measures used.)
   4. Any modifications to controls are documented in the SWPPP, which includes the ESC plan.
   5. Self-inspections are conducted every four business days or as required.
   6. Completed and signed inspection reports are kept at the project site.
   7. Items identified during inspections requiring correction action are properly documented and addressed.
   8. The ESC Pre-storm checklist provided in the plan / SWPPP is used and followed accordingly.

E. Permits: The Contractor is responsible for complying with all applicable State, Federal, and Local permits which are required for construction, including, but not limited to:
   1. Virginia Water Protection Permits issued by the Virginia DEQ
   2. General Nationwide Permits issued by the US Army Corps of Engineers
   3. Land Disturbing Activity (LDA) permits (Virginia Stormwater Management Program (VSMP) authority permits) issued by Arlington County
   4. General Virginia Pollutant Discharge Elimination System (VPDES) Permit for Discharges of Stormwater from Construction Activity issued by Virginia DEQ.
   5. A separate VPDES permit, issued by DEQ may be required for certain non-stormwater discharges such as contaminated groundwater.

F. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.

G. Erosion and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

H. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
   1. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures

I. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.

J. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
   1. Locations of dust-control partitions at each phase of work.
   2. HVAC system isolation schematic drawing.
   3. Location of proposed air-filtration system discharge.
   4. Waste-handling procedures.
   5. Other dust-control measures.

K. Equipment:
   1. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
   2. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
      a. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
   3. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations (per OSHA Standards), observations, inspections, and traffic conditions.
      a. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
   4. Waste Disposal Facilities: Comply with requirements specified in Division 1 Section "Construction Waste Management."
   5. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 PRODUCTS

2.1 MATERIALS

A. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top and bottom rails. Provide concrete bases for supporting posts.

B. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors.

C. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

D. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats minimum 36 by 60 inches.

E. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

F. Gypsum Board: Minimum 1/2 inch (12.7 mm) thick by 48 inches (1219 mm) wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and above ground foundations adequate for normal loading. The field office shall be set up in an acceptable location, and in proximity to sewer/water lines when practicable. It is the Contractor’s responsibility to secure the location of the field office. The field office shall be equipped and completely operational for use three days prior to start of any work, and shall remain at the site until field records pertinent to the project have been completed, not to exceed 30 calendar days after acceptable completion of all Contract work

B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations. The contractor shall work within the staging areas as noted on the contract drawings.
   1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.
1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use. Install water service and distribution piping in sizes and pressures adequate for construction.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.

F. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
    a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
    b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
1. Install electric power service overhead unless otherwise indicated.
2. Connect temporary service to Owner's existing power source, as directed by Owner.

H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.4 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:
1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect Schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.
3. The Contractor shall provide a traffic control plan and devices including qualified flagman during delivery of material and equipment or during performance of site work. Contractor shall work in tandem with building security to assure all vehicles entering and leaving the building have full access and priority at all times.

C. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

D. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
1. Identification Signs: Provide, permit, and install project identification signs as indicated on Drawings and in the specifications.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
    a. Provide temporary, directional signs for construction personnel and visitors.
3. Maintain and touch up signs so they are legible at all times.

E. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

G. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
   1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

H. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
   1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
   1. Comply with work restrictions specified in Section 011000 "Summary."

C. Temporary Erosion and Sedimentation Control: Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

D. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.

E. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
   1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
   2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

F. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

H. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

I. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction and requirements indicated on Drawings.

1. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
2. Paint and maintain appearance of walkway for duration of the Work.

J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

K. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
2. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.
a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.
3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
4. Insulate partitions to control noise transmission to occupied areas.
5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
6. Protect air-handling equipment.
7. Provide walk-off mats at each entrance through temporary partition.

L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

3. Indicate methods to be used to avoid trapping water in finished work.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
   1. Protect porous materials from water damage.
   2. Protect stored and installed material from flowing or standing water.
   3. Keep porous and organic materials from coming into prolonged contact with concrete.
   4. Remove standing water from decks.
   5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
   1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
   2. Keep interior spaces reasonably clean and protected from water damage.
   3. Periodically collect and remove waste containing cellulose or other organic matter.
   4. Discard or replace water-damaged material.
   5. Do not install material that is wet.
   6. Discard and replace stored or installed material that begins to grow mold.
   7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
   1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
   2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
   3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
      a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
      b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
      c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.7 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.
   1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than

Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION

SECTION 01 60 00 - PRODUCT 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 selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:
   1. Section 014200 "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
   1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
   2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
   3. Comparable Product: Product that is demonstrated and approved by Architect through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.

C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications. Submit a comparable product request, if applicable.

D. 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 A/E.
3. Specified options of products and construction methods included in Contract Documents.
4. The Contractor's determination of and compliance with governing
5. regulations and orders issued by governing authorities.

1.4 ACTION SUBMITTALS

A. Comparable Product Request Submittal: Submit request for consideration of each comparable product. Identify basis-of-design product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
   2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
      a. Form of Architect's Approval of Submittal: As specified in Section 013300 "Submittal Procedures."
      b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

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

B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
   1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
   2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
      a. Name of product and manufacturer.
      b. Model and serial number.
      c. Capacity.
      d. Speed.
      e. Ratings.
   3. See individual identification sections in Divisions 21, 22, 23, and 26 for additional identification requirements.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

B. Delivery and Handling:
   1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
   2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
   3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
   4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:
   1. Store products to allow for inspection and measurement of quantity or counting of units.
   2. Store materials in a manner that will not endanger Project structure.
   3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
   4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
   5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
   6. Protect stored products from damage and liquids from freezing.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
   1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
   2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
   1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
   2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
   3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
   1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
   2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
   3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
   4. Where products are accompanied by the term "as selected," Architect will make selection.
   5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
   6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
      a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Evaluation of "or equal" product status is by the Architect; whose determination is final.

B. Product Selection Procedures:
   1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
      a. Sole product may be indicated by the phrase: "Subject to compliance with requirements, provide the following: …"
   2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
      a. Sole manufacturer/source may be indicated by the phrase: "Subject to compliance with requirements, provide products by the following: …"
   3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
      a. Limited list of products may be indicated by the phrase: "Subject to compliance with requirements, provide one of the following: …"
   4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, which complies with requirements.
      a. Non-limited list of products is indicated by the phrase: "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following: …"
   5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
      a. Limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, provide products by one of the following: …"

6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, which complies with requirements.
    a. Non-limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following: …"
7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
    a. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.

C. Visual Matching Specification: Where Specifications require "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
2. Evidence that proposed product provides specified warranty.
3. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
4. Samples, if requested.

B. Submittal Requirements: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

2.3 P3 EXECUTION (Not Used)

END OF SECTION

SECTION 01 74 19 - 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 042000 "Unit Masonry" for disposal requirements for masonry waste.
   2. Section 044313.13 "Anchored Stone Masonry Veneer" for disposal requirements for excess stone and stone waste.
   3. Section 044313.16 "Adhered Stone Masonry Veneer" for disposal requirements for excess stone and stone waste.
   4. 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 30 days of date established for the Notice to Proceed.

1.6 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste and Form CWM-8 for demolition waste. 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. Qualification Data: For waste management coordinator and refrigerant recovery technician.

H. 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.

I. Refrigerant Recovery: Comply with requirements in Section 024119 "Selective Demolition" for refrigerant recovery submittals.

1.7 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Experienced firm, or individual employed and assigned by General Contractor, with a record of successful waste management coordination of projects with similar requirements. Superintendent may serve as Waste Management Coordinator.

B. Refrigerant Recovery Technician Qualifications: Comply with requirements in Section 024119 "Selective Demolition."

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

D. Waste Management Conference(s): Conduct conference(s) at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
   1. Review and discuss waste management plan including responsibilities of each contractor and waste management coordinator.
   2. Review requirements for documenting quantities of each type of waste and its disposition.
   3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
   4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
   5. Review waste management requirements for each trade.

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 and construction waste generated by the Work. Use Form CWM-1 for construction waste and Form CWM-2 for demolition waste. 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. Use Form CWM-3 for construction waste and Form CWM-4 for demolition waste. 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 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. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
   4. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
   5. 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.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there were no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use Form CWM-5 for construction waste and Form CWM-6 for demolition waste. Include the following:
   1. Total quantity of waste.
   2. Estimated cost of disposal (cost per unit). Include transportation and tipping fees and cost of collection containers and handling for each type of waste.
   3. Total cost of disposal (with no waste management).
   4. Revenue from salvaged materials.
   5. Revenue from recycled materials.
   6. Savings in transportation and tipping fees by donating materials.
   7. Savings in transportation and tipping fees that are avoided.

8. Handling and transportation costs. Include cost of collection containers for each type of waste.
9. Net additional cost or net savings from waste management plan.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 50 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, including the following:
   1. Demolition Waste:
      a. Asphalt paving.
      b. Concrete.
      c. Concrete reinforcing steel.
      d. Brick.
      e. Concrete masonry units.
      f. Wood studs.
      g. Wood joists.
      h. Plywood and oriented strand board.
      i. Wood paneling.
      j. Wood trim.
      k. Structural and miscellaneous steel.
      l. Rough hardware.
      m. Roofing.
      n. Insulation.
      o. Doors and frames.
      p. Door hardware.
      q. Windows.
      r. Glazing.
      s. Metal studs.
      t. Gypsum board.
      u. Acoustical tile and panels.
      v. Carpet.
      w. Carpet pad.
      x. Demountable partitions.
      y. Equipment.
      z. Cabinets.
      aa. Plumbing fixtures.
      ab. Piping.
      ac. Supports and hangers.
      ad. Valves.
      ae. Sprinklers.
      af. Mechanical equipment.
      ag. Refrigerants.
      ah. Electrical conduit.
      ai. Copper wiring.
      aj. Lighting fixtures.
      ak. Lamps.

al. Ballasts.
am. Electrical devices.
an. Switchgear and panelboards.
ao. Transformers.

2. Construction Waste:
   a. Masonry and CMU.
   b. Lumber.
   c. Wood sheet materials.
   d. Wood trim.
   e. Metals.
   f. Roofing.
   g. Insulation.
   h. Carpet and pad.
   i. Gypsum board.
   j. Piping.
   k. Electrical conduit.
   l. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
      1) Paper.
      2) Cardboard.
      3) Boxes.
      4) Plastic sheet and film.
      5) Polystyrene packaging.
      6) Wood crates.
      7) Wood pallets.
      8) Plastic pails.
   m. Construction Office Waste: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following construction office waste materials:
      1) Paper.
      2) Aluminum cans.
      3) Glass containers.

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. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
   1. Distribute waste management plan to everyone concerned within seven days of submittal return.
   2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

C. 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 024119 "Selective Demolition" for salvaging demolition waste.

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 Owner.

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 1-1/2-inch size.

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. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.

G. 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.

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

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

J. 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.

K. 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.

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

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

N. 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

SECTION 01 77 00 - CLOSEOUT 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 contract closeout, including, but not limited to, the following:
   1. Substantial Completion procedures.
   2. Final completion procedures.
   3. Warranties.
   4. Final cleaning.
   5. Repair of the Work.

B. Related Requirements:
   1. Section 013233 "Photographic Documentation" for submitting final completion construction photographic documentation.
   2. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
   3. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
   4. Section 017900 "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of cleaning agent.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at final completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.
    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.
5. Submit testing, adjusting, and balancing records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Before requesting inspection for certification of Substantial Completion, complete the following:
1. Submit six copies of applied repair product information, care, and warranties workmanship bonds, maintenance service agreements, final certifications, and similar documents for approval by the A/E of Record.
2. Complete startup testing of systems and initial system commissioning (seasonal systems commissioning will occur in accordance with Specification Section 01815 “HVAC Commissioning”).
3. Three sets of black/blue line prints of the "as-built" site plan and building drawings or Digital copy as approved by the Project Officer and receive written approval from the A/E of Record that the drawings are complete.
4. Acceptance of HVAC system performance including Building Automation Controls by Arlington County Commissioning Authority.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems as required by the Specifications.
6. Submit operations and maintenance manuals and receive written approval from the A/E of Record that the manuals are complete.
7. Submission of certificate of final inspection from city, county and/or state agencies in accord with applicable codes, laws and ordinances.
8. The Contractor is responsible for securing any (partial or full) occupancy permits required by local authorities. The contractor shall obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities.
9. Perform the first final cleaning as described herein.
10. Obtain inspection of fire protection system (sprinkler system) by the Fire Marshal's office and Owner's Insurance Rating Bureau plus correction of any deficiencies identified by Arlington County.
11. Provide electrical systems fully operating, inspection and acceptance by appropriate authorities.
12. All labeling shall be complete as required in the Specifications.
13. All safety devices shall be fully operational.

14. All pressure vessels must be inspected and approved by appropriate state and local authorities.

D. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
   1. Advise Owner of pending insurance changeover requirements.
   2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
   3. Complete startup and testing of systems and equipment.
   4. Perform preventive maintenance on equipment used prior to Substantial Completion.
   5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
   6. Advise Owner of changeover in utility services.
   7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
   8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
   9. Complete final cleaning requirements.
   10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

E. Validation: Submit a written request for validation of Substantial Completion. On receipt of request, Arlington County will either proceed with validation or notify Contractor of unfulfilled requirements. A/E will prepare the Certificate of Substantial Completion after substantial completion validation or will notify Contractor of items, either on Contractor's list or additional items identified by A/E, which must be completed or corrected before certificate will be issued.

F. Upon issuance of a Certificate of Substantial Completion, the seasonal commissioning and warranty period shall begin. As a component of the warranty period, the contractor shall participate in the seasonal commissioning activities as required by Commissioning Specification Section. Seasonal commissioning shall occur regardless of the time of year in which Substantial Completion occurs.

G. At Substantial Completion of the Contract (this does not include individual phase), the retainage, or escrow, may be reduced at the Project Officers approval (no less than 1% remaining).

H. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
   1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
   2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.
5. Submit final completion photographic documentation.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
   1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
   1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
   2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
   3. Include the following information at the top of each page:
      a. Project name.
      b. Date.
      c. Name of Architect.
      d. Name of Contractor.
      e. Page number.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

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

D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
   1. Submit on digital media acceptable to Architect.

E. Warranties in Paper Form:

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

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

PART 2 PRODUCTS

2.1 MATERIALS

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

PART 3 EXECUTION

3.1 FINAL CLEANING

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

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
    d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    e. Remove snow and ice to provide safe access to building.
    f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    h. Sweep concrete floors broom clean in unoccupied spaces.
    i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
    j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.

k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
p. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

D. Construction Waste Disposal: Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

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 preparing operation and maintenance manuals, including the following:
   1. Operation and maintenance documentation directory manuals.
   2. Emergency manuals.
   3. Systems and equipment operation manuals.
   4. Systems and equipment maintenance manuals.
   5. Product maintenance manuals.

B. Related Requirements:
   1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
   2. Section 019113 "General Commissioning Requirements" for verification and compilation of data into operation and maintenance manuals.
   3. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
   1. Architect and Commissioning Authority will comment on whether content of operation and maintenance submittals is acceptable.
   2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operation and maintenance manuals in the following format:
   1. Submit on digital media acceptable to Architect by uploading to web-based project software site or by email to Architect. Enable reviewer comments on draft submittals.
   2. Submit three paper copies. Architect, through Construction Manager, will return two copies.

C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect and Commissioning Authority will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect and Commissioning Authority will return copy with comments.
   1. Correct or revise each manual to comply with Architect's and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.

E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
   1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
   2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.
   1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
      a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
      b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
   2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
   3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
   4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
   5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
      a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
      b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.

B. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
   1. Title page.
   2. Table of contents.
   3. Manual contents.

C. Title Page: Include the following information:
   1. Subject matter included in manual.
   2. Name and address of Project.
   3. Name and address of Owner.
   4. Date of submittal.
   5. Name and contact information for Contractor.
   6. Name and contact information for Construction Manager.
   7. Name and contact information for Architect.
   8. Name and contact information for Commissioning Authority.
   9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
   10. Cross-reference to related systems in other operation and maintenance manuals.

D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
   1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

F. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.7 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
   1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
   2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
   3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

1.8 EMERGENCY MANUALS

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Content: Organize manual into a separate section for each of the following:
   1. Type of emergency.
   2. Emergency instructions.
   3. Emergency procedures.

C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
   1. Fire.
   2. Flood.
   3. Gas leak.
   4. Water leak.
   5. Power failure.
   6. Water outage.
   7. System, subsystem, or equipment failure.
   8. Chemical release or spill.

D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

E. Emergency Procedures: Include the following, as applicable:
   1. Instructions on stopping.
   2. Shutdown instructions for each type of emergency.
   3. Operating instructions for conditions outside normal operating limits.
   4. Required sequences for electric or electronic systems.
   5. Special operating instructions and procedures.

1.9 SYSTEMS AND EQUIPMENT OPERATION MANUALS

A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
   1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
   2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
   1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
   2. Performance and design criteria if Contractor has delegated design responsibility.
   3. Operating standards.
   4. Operating procedures.
   5. Operating logs.
   6. Wiring diagrams.
   7. Control diagrams.
   8. Piped system diagrams.

9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

C. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

D. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.10 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.

C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
    a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

J. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of maintenance manuals.

1.11 PRODUCT MAINTENANCE MANUALS

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Product Information: Include the following, as applicable:
   1. Product name and model number.
   2. Manufacturer's name.
   3. Color, pattern, and texture.
   4. Material and chemical composition.
   5. Reordering information for specially manufactured products.

E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
   1. Inspection procedures.
   2. Types of cleaning agents to be used and methods of cleaning.
   3. List of cleaning agents and methods of cleaning detrimental to product.
   4. Schedule for routine cleaning and maintenance.
   5. Repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

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 project record documents, including the following:
   1. Record Drawings.
   2. Record Specifications.
   3. Record Product Data.
   4. Miscellaneous record submittals.

B. Related Requirements:
   1. Section 017300 "Execution" for final property survey.
   2. Section 017700 "Closeout Procedures" for general closeout procedures.
   3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:
   1. Number of Copies: Submit copies of record Drawings as follows:
      a. Initial Submittal:
         1) Submit record digital data files and one set(s) of plots.
         2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
      b. Final Submittal:
         1) Submit one paper-copy set(s) of marked-up record prints.
         2) Submit record digital data files and three set(s) of record digital data file plots.
         3) Plot each drawing file, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one paper copy and one annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one paper copy and one annotated PDF electronic files and directories of each submittal.
   1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy and one annotated PDF electronic files and directories of each submittal.

E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.4 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
   1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
      a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
      b. Accurately record information in an acceptable drawing technique.
      c. Record data as soon as possible after obtaining it.
      d. Record and check the markup before enclosing concealed installations.
      e. Cross-reference record prints to corresponding photographic documentation.
   2. Content: Types of items requiring marking include, but are not limited to, the following:
      a. RFI's
      b. Clarifications made in approved submittals
      c. Dimensional changes to Drawings.
      d. Revisions to details shown on Drawings.
      e. Depths of foundations.
      f. Locations and depths of underground utilities.
      g. Revisions to routing of piping and conduits.
      h. Revisions to electrical circuitry.
      i. Actual equipment locations.
      j. Duct size and routing.
      k. Locations of concealed internal and underground utilities.
      l. Changes made following Architect's written orders.
      m. Details not on the original Contract Drawings.
      n. Field records for variable and concealed conditions.
      o. Record information on the Work that is shown only schematically.
      p. Modifications to equipment schedules, with specific attention to deviations from named "Basis of Design" vendors and equipment capacities.
      q. Modifications to Building Automation Controls systems operating logic.
      r. Any changes in grade and location of duct banks and appurtenances.
   3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
   4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
   5. Mark important additional information that was either shown schematically or omitted from original Drawings.
   6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
   1. Format: Annotated PDF electronic file.
   2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
   3. Refer instances of uncertainty to Architect for resolution.

4. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
    a. See Section 013100 "Project Management and Coordination" for requirements related to use of Architect's digital data files.
    b. Architect will provide data file layer information. Record markups in separate layers.

C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:
    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect.
    e. Name of Contractor.

1.5 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. Note related Change Orders, record Product Data, and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file and one paper copy.

1.6 RECORD PRODUCT DATA

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

C. Format: Submit record Product Data as annotated PDF electronic file.
1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.7 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file.
   1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.8 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store record documents in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

PART 2 PRODUCTS

PART 3 EXECUTION

END OF SECTION

SECTION 01 79 00 - DEMONSTRATION AND TRAINING

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 instructing Owner's personnel, including the following:
   1. Instruction in operation and maintenance of systems, subsystems, and equipment.
   2. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
   1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

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

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
   1. Identification: On each copy, provide an applied label with the following information:
      a. Name of Project.
      b. Name and address of videographer.
      c. Name of Architect.
      d. Name of Construction Manager.
      e. Name of Contractor.
      f. Date of video recording.
   2. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
   3. At completion of training, submit complete training manual(s) for Owner's use prepared in same PDF file format required for operation and maintenance manuals specified in Section 017823 "Operation and Maintenance Data."

1.5 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.

D. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
   1. Inspect and discuss locations and other facilities required for instruction.
   2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
   3. Review required content of instruction.
   4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

1.7 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
   1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
      a. System, subsystem, and equipment descriptions.
      b. Performance and design criteria if Contractor is delegated design responsibility.
      c. Operating standards.
      d. Regulatory requirements.
      e. Equipment function.
      f. Operating characteristics.
      g. Limiting conditions.
      h. Performance curves.
   2. Documentation: Review the following items in detail:
      a. Emergency manuals.

b. Systems and equipment operation manuals.
c. Systems and equipment maintenance manuals.
d. Product maintenance manuals.
e. Project Record Documents.
f. Identification systems.
g. Warranties and bonds.
h. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.
   h. Normal shutdown instructions.
   i. Operating procedures for emergencies.
   j. Operating procedures for system, subsystem, or equipment failure.
   k. Seasonal and weekend operating instructions.
   l. Required sequences for electric or electronic systems.
   m. Special operating instructions and procedures.
5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.
7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning.
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.
8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.

d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

1.8 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

1.9 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
1. Owner will furnish an instructor to describe Owner's operational philosophy.
2. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
1. Schedule training with Owner with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a written performance-based test.

F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

1.10 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full HD mode with vibration reduction technology.
1. Submit video recordings thumb drive or by uploading to web-based Project software site.
2. File Hierarchy: Organize folder structure and file locations according to Project Manual table of contents. Provide complete screen-based menu.
3. File Names: Utilize file names based on name of equipment generally described in video segment, as identified in Project specifications.
4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the equipment demonstration and training recording that describes the following for each Contractor involved on the Project, arranged according to Project Manual table of contents:
a. Name of Contractor/Installer.

b. Business address.
c. Business phone number.
d. Point of contact.
e. Email address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
1. Film training session(s) in segments not to exceed 15 minutes.
a. Produce segments to present a single significant piece of equipment per segment.
b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
1. Furnish additional portable lighting as required.

E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 2 PRODUCTS

PART 3 EXECUTION

END OF SECTION

SECTION 02 30 00 - SUBSURFACE DRILLING AND SAMPLING INFORMATION

PART 1 GENERAL

1.1 The following information is included in the Project Manual for bidders' use in preparing bids, but is not part of the Contract Documents, and does not relieve the bidders from doing their own investigation to determine the accuracy of the information.

A. Report of Subsurface Exploration and Geotecnical Engineering Services, 1425 N. Quincy Street, Arlington, VA; dated September 19, 2019.

1.2 STATEMENT CONCERNING THE BORING DATA

A. The test borings and samples of the soils encountered were obtained by the Architect to assist the Architect and his consultants in determining the type and design of the foundation systems.

B. The test borings were made by ECS Mid-Atlantic, LLC, in accordance with their system of soils classification and they, ECS Mid-Atlantic, LLC, neither the Owner, the Architect, or his consultants guarantee the accuracy or consistency of the information contained within the Geotechnical Report with the actual site conditions.

C. Any radical deviation from the anticipated material, as indicated by the borings, during the excavation for the building should be reported to the Architect immediately and confirmed in writing.

1.3 CONFIRMATION OF BORING DATA

A. Bidders, Contractors, and any others who are concerned with, or are affected by the test borings should make their own borings and tests at the site.

B. No additional compensations will be allowed the Contractor for failure to fully investigate the site or for the neglect of the information contained in the Boring Logs.

1.4 ATTACHMENT

A. Report of Subsurface Exploration and Geotecnical Engineering Services, 1425 N. Quincy Street, Arlington, VA; dated September 19, 2019.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 02 4113 - SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The provisions of the Contract Documents apply to the work of this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of existing asphalt and/or concrete pavement, concrete and/or asphalt walks, curbs and gutters, and other exterior site items indicated or not indicated which interfere with the Work.

2. Removal and disposal of existing storm drainage pipe and appurtenances indicated. Filling of existing pipes to be abandoned in place.

1.3 DEFINITIONS

A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.

B. Remove and Salvage: Items indicated to be removed and salvaged remain the Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to Owner's designated storage area.

C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated.

D. Existing to Remain: Protect items indicated to remain against damage and soiling. When permitted by the Architect, items may be removed to a suitable, protected storage location and then cleaned and reinstalled in their original locations.

1.4 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, remove demolished materials from the site with further disposition at the Contractor's option.

B. Storage or sale of removed items or materials on-site will not be permitted.

C. Historical items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to the Owner, which may be encountered, remain the Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to the Owner.

1.5 SUBMITTALS

A. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by the Work.

B. Record drawings at Project closeout.

1. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.

C. Proposed dust-control measures.

D. Schedule of selective demolition activities indicating the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.

2. Interruption of utility services.

3. Coordination for shutoff, capping, and continuation of utility services.

4. Detailed sequence of selective demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.

5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

6. Locations of temporary partitions and means of egress.

E. Inventory of items to be removed and salvaged or turned over to Owner.

F. Landfill records indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements: All work shall comply with Federal, State and Local laws and regulations concerning hauling and disposal of demolition debris.

B. Notify the proper agencies prior to the start of work and obtain all necessary permits for this work.

1.7 PROJECT CONDITIONS

A. Owner assumes no responsibility for actual condition of items or structures to be demolished. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner to the extent practical. However, minor variations may occur due to Owner’s removal and salvage operations prior to the start of demolition work.

B. The location of existing underground utilities indicated is approximate only. Field locate all existing underground utilities in the area of work, regardless of whether or not they are indicated. Call “Miss Utility” prior to the start of demolition work for assistance in the location of existing underground utilities.

C. Should charted, uncharted or incorrectly charted utilities be encountered during demolition, contact the Architect immediately for instructions. Cooperate with Owner and utility companies to keep services and facilities in operation.

D. Do not interrupt existing utilities serving facilities occupied and used by the Owner and others, except when permitted in writing by the Owner. Provide acceptable temporary utility service as required to maintain Owner's operations.

1.8 SCHEDULING

A. Owner will occupy portions of the building immediately adjacent to the Work. Conduct selective demolition so that the Owner's operations will not be disrupted. Provide not less than 72 hours notice to Owner of activities that will affect Owner's operations.

B. Arrange selective demolition schedule so as not to interfere with Owner's on-site operations.

C. Notify and coordinate any required relocation and/or removal of existing underground utilities, poles, meters or other above ground appurtenances with the appropriate utility company (i.e. power, telephone, cable and natural gas/propane) prior to the start of selective demolition work.

1.9 PAYMENT FOR UTILITY REMOVAL / RELOCATIONS

A. Electric Service – shall be included in contract amount.

B. Phone Service – shall be included in contract amount.

C. Cable Television – shall be included in contract amount.

D. Gas – shall be included in contract amount.

E. Fiber Optic Lines – shall be included in contract amount.

F. Private Data – shall be included in contract amount

1.10 USE OF EXPLOSIVES

A. Do not use explosives to perform selective site demolition work.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Call "Miss Utility" prior to the start of demolition work for assistance in the location of existing underground utilities. Field locate all existing underground utilities in the area of work, regardless of whether or not they are indicated.

B. Should uncharted or incorrectly charted existing utilities be identified, contact the Architect immediately for instructions. Provide a scale drawing with the location of the uncharted or incorrectly charted utilities for use by the Architect in preparing additional direction.

C. Verify that utilities indicated as removed, abandoned and/or relocated have been disconnected and capped.

D. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

E. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged and turned over to the Owner.

3.2 PROTECTION OF PERSONS AND PROPERTY

A. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

B. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

C. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around selective demolition area.

1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.

2. Protect existing site improvements, appurtenances, and landscaping to remain.

D. Barricade areas of demolition occurring as part of this work, and post with warning lights as required by authorities having jurisdiction.

E. Protect structures, buildings, utilities, walks, pavements, existing vegetation and other facilities to remain from damage caused by settlement, lateral movement, undermining, washout and other hazards created by demolition operations.

3.3 POLLUTION CONTROLS

A. Perform all work in accordance with the requirements of the latest edition of the Virginia Erosion and Sediment Control Handbook and those of the local Erosion Control official.

B. Clean adjacent structures and improvements of dust, dirt, and debris caused by the Work. Return adjacent areas to condition existing before start of selective demolition.

3.4 DEMOLITION OF EXISTING FACILITIES

A. Asphalt Pavement

1. Remove asphalt concrete pavement by sawcutting to the full depth of the pavement. Provide neat sawcuts at the limits of pavement removal indicated.

B. Concrete Pavement, Walks and Curbs

1. Remove concrete pavement and walks to the nearest joint. Sawcut concrete if joints are not present adjacent to the area of demolition.

2. Sawcut concrete along straight lines to a depth of not less than 2 inches. Break out remainder of concrete, provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or sawcut entirely through concrete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Do not burn demolished materials or debris.

C. Transport and legally dispose of demolished materials off of Owner's property.

3.6 CLEANUP AND REPAIR

A. Upon completion of demolition work remove all tools, equipment and demolition materials from site. Remove demolition work area protection and leave areas clean.

B. Repair any demolition performed in excess of that required. Return elements of construction and surfaces to remain to the condition existing prior to the start of construction. Repair adjacent construction or surfaces soiled or damaged by demolition work.

END OF SECTION 02 4113

SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Demolition and removal of selected portions of building or structure.

1.2 DEFINITIONS

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

B. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

C. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

D. Demolish: Tearing down, destruction, breakup, razing or removal of the whole or part of a building or structure, or a free standing machinery or equipment that is directly related to the function of the structure.

E. Recycle: Recovery of demolition waste for subsequent processing in preparation for reuse.

1.3 SUBMITTALS

A. Predemolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations.

1.4 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

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

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

D. Standards: Comply with ANSI A10.6 and NFPA 241.

E. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Administrative Requirements."

1.5 PROJECT CONDITIONS

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

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

C. The procedures proposed for the accomplishment of the work should provide for the safe conduct of the work.

D. 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.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Owner.

D. Engage a professional engineer to survey 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 selective demolition operations.

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

F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
   1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
   2. Information available: The following reports are provided as attachments to this section, for information purposes only; these reports are excluded from Contract Documents.
      a. These reports do not relieve the Contractor from conducting any testing or inspections to verify the presence of hazardous materials.
      b. The report information cannot, by its nature, reveal all conditions that may exist at the place of the work, or what may be discovered in the course of work. Should conditions be found to vary substantially from the report information, advise the Owner accordingly and request direction.
      c. Reports provided for information only:
         1) Phase I Environment Site Assessment Report; prepared by ECS Mid-Atlantic, LLC; dated February 10, 2015.
         2) Phase II Environment Site Assessment Report; prepared by ECS Mid-Atlantic, LLC; dated April 15, 2015.
   3. Owner has engaged ECS Mid-Atlantic for inspection and testing related to contaminated soil, if discovered during excavations and foundation work; ECS responsibilities are described as follows:
      a. Prior to the disposal of the petroleum-impacted material offsite, a waste profile form needs to be submitted to the disposal facility for acceptance; ECS will support

Contractor complete the profile form. In addition to the profile form, a soil sample needs to be collected from the material to be excavated and tested for the parameters required by the disposal facility to show the facility the contaminant concentrations are within their permit limits for acceptance; ECS will collect the soil sample and have it analyzed by the lab.

b. Once the material has been approved by the disposal facility, they will issue manifests. During excavation activities, ECS will be onsite to help screen the material and segregate petroleum-impacted from nonpetroleum-impacted material for proper disposal; ECS will also sign a manifest for each truck transporting petroleum-impacted material as the Owner's onsite agent.

c. ECS will produce daily reports that include the areas excavated, results of field screening and number of truckloads that transported petroleum-impacted material offsite.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated 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, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
   3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
      a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

3.3 PREPARATION

A. 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.

B. Temporary Facilities: 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. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
   3. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 1 Section "Temporary Facilities and Controls."

C. Temporary Shoring: 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.

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, to minimize disturbance of adjacent surfaces. 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 fire watch and portable fire-suppression devices during flame-cutting operations.
   5. Maintain adequate ventilation when using cutting torches.
   6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
   7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
   8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
   9. Dispose of demolished items and materials promptly.

B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Owner, 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. Cut concrete to a depth of at least 3/4 inch at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.

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

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

D. Roofing:
   1. Before commencing with cutting and patching of roofing, consult with the Owner regarding the existence of an outstanding roofing warranty. If such a warranty exists, obtain written approval of the methods to be used from the roofing manufacturer who issued the warranty so as not to affect the value of the warranty.
   2. Cut, patch, repair and extend roofing and installation as follows:
      a. Where disturbed or damaged by alteration Work or activities related to same.
      b. Where new Work connects to existing construction.

3. Roof areas penetrated for alterations shall be protected against damage and leakage by the Contractor performing the Work. Roof openings shall not be left uncovered or unprotected overnight or during any periods of rainy or inclement weather.
4. Remove loose aggregate, if applicable, and store away from work area.
5. Work shall be performed in a manner to provide for permanent water-tight splice or repair.
6. Roof repair and alteration Work and materials shall match existing roofing materials and construction.
7. Upon completion and inspection of splice or repair Work, remove debris from the roof and replace the aggregate as required.
8. Protect undisturbed existing and newly repaired roofing subject to traffic and damage.
9. Upon completion of demolition operations requiring the shoring of roof structure, manufacturer holding the existing warranty shall inspect all base flashings and roofing membrane; perform all repairs required following demolition operations.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
   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.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

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.

END OF SECTION

ATTACHMENTS FOR INFORMATION ONLY

Phase I Environment Site Assessment Report; prepared by ECS Mid-Atlantic, LLC; dated February 10, 2015.

Phase II Environment Site Assessment Report; prepared by ECS Mid-Atlantic, LLC; dated April 15, 2015.

PHASE I ENVIRONMENTAL SITE ASSESSMENT REPORT

N QUINCY STREET OFFICE PARK
1423-1439 N QUINCY STREET
ARLINGTON, ARLINGTON COUNTY, VIRGINIA 22207

ECS PROJECT NO. 01-23933

FOR

ARLINGTON COUNTY ENVIRONMENTAL SERVICES

FEBRUARY 10, 2015

February 10, 2015

Mr Tim O'Hora
Arlington County Environmental Services
Engineering & Capital Projects Division
2100 Clarendon Blvd., Suite 800
Arlington, Virginia 22201

ECS Project No. 01-23933

Reference: Phase I Environmental Site Assessment Report, N Quincy Street Office Park, 1423-1439 N Quincy Street, Arlington, Arlington County, Virginia 22207

Dear Mr O'Hora:

ECS Mid-Atlantic, LLC, (ECS) is pleased to provide Arlington County Environmental Services with the results of our Phase I Environmental Site Assessment (ESA) for the referenced site. ECS services were provided in general accordance with ECS Proposal No.4932-EP and generally meet the requirements of ASTM E 1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process and EPA Standards and Practices for All Appropriate Inquiry contained in 40 CFR Part 312.

If there are questions regarding this report, or a need for further information, please contact the undersigned at (703) 471-8400.

ECS MID-ATLANTIC, LLC

Elizabeth M. Boone
Environmental Staff Project Manager

Douglas J. Finch
Environmental Sr. Project Manager

ECS Project No. 01-23933
February 10, 2015

ENVIRONMENTAL PROFESSIONAL STATEMENT

We declare that, to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in § 312.10 of 40 CFR 312. We have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. We have developed and performed all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Douglas J. Finch February 10, 2015
Environmental Sr. Project Manager

Phase I Environmental Site Assessment Report
N Quincy Street Office Park
1423-1439 N Quincy Street
Arlington, Arlington County, Virginia 22207

CLIENT

Arlington County Environmental Services
Engineering & Capital Projects Division
2100 Clarendon Blvd., Suite 800
Arlington, Virginia 22201

SUBMITTED BY

ECS Mid-Atlantic, LLC
14026 Thunderbolt Place
Suite 100
Chantilly, Virginia 20151-3232

PROJECT 01-23933

DATE February 10, 2015

PHASE I ENVIRONMENTAL SITE ASSESSMENT REPORT
N QUINCY STREET OFFICE PARK
1423-1439 N QUINCY STREET
ARLINGTON, ARLINGTON COUNTY, VIRGINIA 22207

ECS PROJECT NO. 01-23933

SECTION **PAGE**

APPENDICES

1.0 EXECUTIVE SUMMARY

ECS Mid-Atlantic, LLC (ECS) was contracted by Arlington County Environmental Services to perform an ASTM Standard E 1527-13, Phase I Environmental Site Assessment (ESA) of the N Quincy Street Office Park (i.e. site or subject site). This Executive Summary is an integral part of the Phase I Environmental Site Assessment report. ECS recommends that the report be read in its entirety.

The subject site is located at 1423-1439 N Quincy Street, Arlington, Virginia. The site is identified as Arlington County RPC Numbers 15-040-045, 15-040-046, 15-040-047, and 15-040-048. The approximate 6-acre subject site is currently occupied by NOVA MMA, a martial arts gym, and Dynamics Gymnastics. At the time of our site reconnaissance, the subject site was developed with four structures- two one-story warehouse type buildings (1423-25 and 1435 N Quincy Street) and two three-story office buildings (1429 and 1439 N Quincy Street). The site is located in an area that can generally be described as residential. The site is serviced by natural gas, electric, municipal water and sanitary sewer services. The buildings are heated via electric roof-mounted units. One out of service, diesel fueled emergency generator was observed along the eastern side of 1429 N Quincy Street. The generator was installed and maintained by a former tenant, ITT Corporation.

The site is located in a residential area of Arlington, Virginia. The site is bounded on the north by Interstate 66 beyond a steep slope. Areas farther north contain the Custis Trail and residential properties. The site is bounded on the east by N Quincy Street. Areas farther east contain an administrative building for Arlington County Public Schools, a planetarium for Arlington County Public Schools, and Washington-Lee High School. The site is bounded on the south by single family homes along 14th Street N, N Nelson Street, and N Monroe Street. Areas farther south also contain single family homes. The site is bounded on the west by Hayes Park with N Lincoln Street and Arlington Science Focus Elementary School beyond. None of the adjacent properties observed during our site reconnaissance are expected to represent an environmental concern for the subject site. We did not identify adjoining or nearby properties that are considered to present a REC for the site.

Based on the records search, site reconnaissance and interviews, it appears that the site was improved with a rail trestle and associated coal yard from at least 1934 until approximately 1959. A sheet metal warehouse was constructed at the site circa 1959, at the location of 1429 N Quincy Street. A storage warehouse and auto repair shop was constructed circa 1959 at the location of 1439 N Quincy Street. A warehouse was constructed circa 1960 at 1435 N Quincy Street. According to city directories, previous reports reviewed as part of this assessment, and interviews, former occupants of the on-site buildings include: a sheet metal and roofing operation, a tour bus company and bus repair operation, a bowling alley, a radar production and testing operation, a USPS facility, clerical offices, and gyms. Historical records prior to 1934 were not reasonably ascertainable for the site. For more discussion of historical records, see Section 5.4.

Our review of historical information for adjoining or nearby properties identified the site area was originally industrial in connection with the former Washington & Old Dominion Railroad (W&OD), which transitioned to residential development over time. Our historical review did not identify adjoining or nearby properties that are considered a REC for the site.

A regulatory database search report was provided by Environmental Data Resources, Inc. (EDR). The EDR report identifies the subject site on environmental regulatory databases. The subject is identified on the Registered UST and Leaking UST (LUST) case as “Cooper Quincy 66 Partnership” (1439 N Quincy Street), and RCRA Generators database as “Systems Planning Corporation” (1425 N Quincy Street).

ECS reviewed the LUST case file at VDEQ's Northern Region Office. The file included a Site Characterization Report (SCR) prepared by Ogden Environmental & Energy Services (Ogden) in July 1992, which was also provided to ECS by the current owner Mr. William Buck. Information contained in the case file indicates two 4,000-gallon USTs were removed from the area between 1435 and 1439 N Quincy Street in 1989. Two of five soil samples collected from the tank excavation following tank removal contained total petroleum hydrocarbons (TPH) above the regulatory limit of 100 parts per million (ppm). As a result, the State Water Control Board opened a LUST case for the subject site. The SCR involved the installation of five soil test borings, two of which were converted into monitoring wells (MWs), in April 1992. Three MWs were already in place at the site, installed in 1989. The MWs were installed at depths between 27 and 40 feet below surface grade. Groundwater flow direction was determined to the northwest. Soils from the five borings were field screen using a Photoionization Detector (PID) device. Based on PID results, soil samples were selected for laboratory analysis. Laboratory analysis revealed a maximum TPH soil concentration of 63 parts per million (ppm) at 20-22 feet below grade at MW-5, northwest of the former tank pit. Groundwater samples collected from the MWs revealed results below laboratory detection limits for TPH and BTEX. Given the surrounding land use and a lack of sensitive receptors, Ogden recommended no further remediation of the subject site. The Virginia State Water Control Board granted LUST case closure via a letter dated September 25, 1992. A copy of this letter is provided in Appendix III.

The EDR report identified few off-site properties within the minimum ASTM search distances. Based on our review of available public records, their distances, groundwater flow direction inferred from surface topography or regulatory status of these facilities, none of the off-site facilities represent a REC for the subject site.

No significant data gaps are identified. Also, no de minimis conditions were observed.

We have performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Standard E 1527-13 of the N Quincy Street Office Park located at 1423-1439 N Quincy Street, Arlington, Virginia. Exceptions to, or deletions from, this practice are described in Section 2.3 of this report. This assessment has revealed no evidence of recognized environmental conditions in connection with the property, with the exception of the following:

- A western portion of the site was used as a rail trestle and coal yard from at least 1934 until approximately 1959. It is possible residual contamination resulting from these activities remains in the subsurface.

ECS has identified the following historic recognized environmental condition (HREC) item:

- LUST PC#90-0927 was opened at the subject site in 1989 during removal of two 4,000-gallon USTs located between 1435 and 1439 N Quincy Street. The case has since been closed. While no further investigation in connection with this LUST case is warranted at this time, it should be noted that residual contamination may remain in place.

ECS has identified the following business environmental risk (BER) item:

- Given the age of the structures, it is possible asbestos containing materials (ACMs) and/or lead-based paints are present in the buildings.

2.0 INTRODUCTION

2.1 Purpose and Reason for Performing Phase I ESA

The purpose of the ESA was to:

- evaluate the probability of impact to the surface water, groundwater and/or soils within the property boundaries through a review of regulatory information and a reconnaissance of the subject site and vicinity;
- evaluate historical land usage to identify previous conditions that could potentially impact the environmental condition of the site;
- conduct all appropriate inquiry as defined by ASTM Standard E 1527-13 and 40 CFR Part 312;
- evaluate the potential for on-site and off-site contamination; and,
- provide a professional opinion regarding the potential for environmental impact at the site and a list of Recognized Environmental Conditions (RECs).

The ESA should allow the Users the opportunity to qualify for landowner liability protection under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) provided certain stipulations are met. The landowner liability protections are: an innocent landowner, a contiguous property owner, or a bona fide prospective purchaser. The User must meet the protection stipulations detailed in CERCLA to qualify as well as meet the User Obligations contained within ASTM E 1527-13 standard.

The reason for conducting this ESA is to conduct all appropriate inquiries into the uses and prior ownership of the subject site.

2.2 Scope of Services

The environmental assessment was conducted in accordance with ASTM E 1527-13 and EPA Standards and Practices for All Appropriate Inquiry (40 CFR §312.10). The environmental assessment was conducted under the supervision or responsible charge of an individual that qualifies as an environmental professional, as defined in 40 CFR §312.10.

ECS was contracted by Arlington County to perform an ASTM Standard E 1527-13, Phase I Environmental Site Assessment (ESA) of the Arlington Technology Center located at 1425-1439 N Quincy Street in Arlington, Arlington County, Virginia. ECS was not contracted to address non-scope considerations.

2.3 Limitations

The ESA involved a reconnaissance of the site and contiguous properties and a review of regulatory and historical information in accordance with the ASTM standard and EPA regulation referenced herein. No non-scope considerations or additional issues such as asbestos, radon, wetlands or mold were investigated, unless otherwise described in Section 7.0 of this report.

The conclusions and/or recommendations presented within this report are based upon a level of investigation consistent with the standard of care and skill exercised by members of the same profession currently practicing in the same locality under similar conditions. The intent of this assessment is to identify the potential for recognized environmental conditions in connection with the site; however, no environmental site assessment can completely eliminate uncertainty regarding the potential for recognized environmental conditions in connection with the site. The findings of this ESA are not intended to serve as an audit for health and safety compliance issues pertaining to improvements or activities at the site. ECS is not liable for the discovery or elimination of hazards that may potentially cause damage, accidents or injury.

Observations, conclusions and/or recommendations pertaining to environmental conditions at the subject site are necessarily limited to conditions observed, and or materials reviewed at the time this study was undertaken. It was not the purpose of this study to determine the actual presence, degree or extent of contamination, if any, at this site. This could require additional exploratory work, including sampling and laboratory analysis. No warranty, expressed or implied, is made with regard to the conclusions and/or recommendations presented within this report.

ASTM E1527-13 defines a "recognized environmental condition (REC)" as "the presence or likely presence of any hazardous substances or petroleum products in, on or at a property: 1) due to release to the environment, 2) under conditions indicative of a release to the environment; or 3) under conditions that pose a material threat of a future release to the environment." For the purposes of this practice, “migrate’ and “migration” refer to the movement of hazardous substances or petroleum products in any form including solid and liquid at the surface or subsurface and vapor in the subsurface. Note: vapor migration in the subsurface is described in Guide E2600 published by ASTM. ECS has not conducted a Vapor Encroachment Screen in accordance with the E2600 guide.

A “*de minimis* condition” is a condition that generally does not represent a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. *De minimis* conditions are not recognized environmental conditions nor controlled recognized environmental conditions.

ASTM E1527-13 defines a "controlled recognized environmental condition (CREC)" as a recognized environmental condition resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority (for example, as evidenced by the issuance of a no further action letter or equivalent, or meeting risk-based criteria established by regulatory authority), with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls (for example property use restrictions, activity and use limitations, institutional controls, or engineering controls). A condition identified as a controlled recognized environmental condition does not imply that the Environmental Professional has evaluated or confirmed the adequacy, implementation or continued effectiveness of the required control that has been, or is intended to be, implemented.

ASTM E1527-13 defines a "historic recognized environmental condition (HREC)" as a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted residential use criteria established by a regulatory authority, without subjecting the property to any required controls (for example property use restrictions, activity and use limitations, institutional controls, or engineering controls). Before calling the past release a historical recognized environmental condition, the Environmental Professional must determine whether the past release is a recognized environmental condition at the time of the Phase I Environmental Site Assessment is conducted (for example, if there has been a change in the regulatory criteria).

ASTM E1527-13 defines a “business environmental risk” as “a risk which can have a material environmental or environmentally-driven impact on the business associated with the current or planned use of a parcel of commercial real estate, not necessarily limited to those environmental issues required to be investigated in this practice”. Client-imposed limitations and site condition limitations, if encountered, are detailed in Section 6.1 Methodology and Limiting Conditions.

This report is provided for the exclusive use of Arlington County. This report is not intended to be used or relied upon in connection with other projects or by other unidentified third parties. The use of this report by any undesignated third party or parties will be at such party’s sole risk and ECS disclaims liability for any such third party use or reliance.

2.4 Data Gaps

Data failures (historical data gaps) were identified during the historical research of this site. Use of the site was generally documented back to 1934. Historical information was missing for various periods. However, due to the historical informaion obtained about the site from Sanborn Fire Insurance Maps, historic aerial photographs, previous reports, and interviews; the historical data gaps are not expected to impact our ability to render a professional opinion regarding the subject site. No other data gaps were identified.

3.0 SITE DESCRIPTION

3.1 Site Location and Legal Description

The assessed area referred to as "site" or "subject site" is located at 1423-1439 N Quincy Street, Arlington, Arlington County, VA. The site is identified as Arlington County RPC Numbers 15-040-045, 15-040-046, 15-040-047, and 15-040-048. According to the Arlington County Department of Real Estate Assessments, the site is currently owned by Cooper Quincy LLC, Cooper Quincy No 1 LLC, and Cooper Quincy No 2 LLC. ECS was not provided with a legal description of the site.

3.2 Physical Setting and Hydrogeology

As determined from the USGS topographical map quadrangle Arlington, VA (Figure 2, Appendix I), the subject site is situated between approximately 240 and 260 feet above mean sea level with topography sloping to the north-northwest. No water bodies are depicted on the site. Based on a review of the topographic map and observations of general area and site topography, surface run-off would be expected to flow over paved surfaces and into below ground storm water sewers. Properties to the south and east are considered topographically up-gradient in relation to the subject site.

The subject site is located within the Coastal Plain Physiographic Province. The soils encountered in this area are the residual product of in-place chemical weathering of rock presently underlying the site and/or historic depositional events. In general, shallow unconfined groundwater movement within the overlying soils is controlled largely by topographic gradients. However, as the ground water percolates downward, it becomes controlled by the subsurface geologic conditions. Thus, the direction of groundwater movement in the deeper aquifers may not be consistent with the reflecting topography.

Surface waters primarily recharge shallow aquifers by infiltration along higher elevations. Once in the shallow aquifer, the groundwater typically discharges into streams or other surface water bodies at lower elevations. The depth of the shallow water table is transient and can vary with seasonal fluctuations in precipitation. Groundwater movement in the shallow aquifer is generally from higher to lower elevations. As such, shallow groundwater is expected to flow generally to the north-northwest. Based on the presumed groundwater flow direction, properties located to the south and east appear to be upgradient relative to the site.

However, regional influences may have an impact on groundwater flow. The actual groundwater flow direction cannot be determined without site-specific information obtained through the installation of groundwater monitoring wells.

3.3 Current Use and Description of the Site

The subject site consists of an approximate 6-acre tract of land that is currently utilized as commercial office space. The subject site is improved with four structures- two one-story warehouse type buildings and two three-story office buildings. The site is located in an area that can generally be described as residential. At the time of our recent site reconnaissance, the site was occupied by NOVA MMA (1423 N Quincy Street) and Dynamic Gymnastics (1435 N Quincy Street). The office buildings addressed as 1425 and 1439 N Quincy Street were unoccupied.

4.0 USER PROVIDED INFORMATION

The ASTM standard includes disclosure and obligations of the User to help the Environmental Professional identify the potential for Recognized Environmental Conditions associated with the site. A User Questionnaire was submitted to Tim O'Hora, Arlington County Environmental Services. ECS did not receive a User Questionnaire prior to issuing this report. If the User Questionnaire is provided at a later date, ECS will review the information and issue an addendum to this report. It should be noted by the User of this report that if the User Questionnaire is not completed and returned by the User for evaluation by ECS, the User that is seeking to qualify for an innocent landowner, a contiguous property owner, or a bona fide prospective purchaser liability defense may waive these rights to qualify under CERCLA. If the Questionnaire is provided following issuance of this report and information contained therein materially changes the outcome of this report, ECS will issue an addendum to this report.

4.1 Title Information

ECS was not provided with title information by the User. If title information is provided, we will review it for evidence of environmental concerns and issue an addendum to this report.

4.2 Environmental Liens or Activity and Use Limitations

ECS was neither contracted to obtain information on environmental liens or activity and use limitations; nor have we been provided with information on environmental liens or activity and use limitations for our review. If this information is provided at a later date, it will be reviewed for evidence of environmental issues and an addendum to this report will be forwarded if the review indicates a material difference in our findings. It should be noted by the User of this report that if the User does not provide activity and use limitation information for evaluation by ECS, the User that is seeking to qualify for an innocent landowner, a contiguous property owner, or a bona fide prospective purchaser liability defense may waive these rights to qualify under CERCLA. If the activity use information is provided following issuance of this report and information contained therein materially changes the outcome of this report, ECS will issue an addendum to this report.

4.3 Specialized Knowledge

The User did not provide specialized knowledge of the subject site.

4.4 Commonly Known or Reasonably Ascertainable Information

Commonly known information related to the subject site was not provided to ECS.

4.5 Valuation Reduction for Environmental Issues

No information pertaining to valuation reduction for environmental issues was provided to ECS.

4.6 Owner, Property Manager, and Occupant Information

Owner, manager, and occupant information was not provided by the User.

4.7 Degree of Obviousness

The User did not provide information related to obvious indicators that point to the presence or likely presence of contamination at the subject site.

5.0 RECORDS REVIEW

A regulatory records search of ASTM standard and supplemental databases was conducted for the site and is included in Appendix III. The regulatory search report in the appendix includes additional details about the regulatory databases that were reviewed. The regulatory records search involves searching a series of databases for facilities that are located within a specified distance from the subject site. The ASTM standard specifies an approximate minimum search distance from the subject site for each database. Pursuant to ASTM, the approximate minimum search distance may be reduced for each standard environmental record except for Federal NPL site list, and Federal RCRA TSD list. According to ASTM, government information obtained from nongovernmental sources may be considered current if the source updates the information at least every 90 days or, for information that is updated less frequently than quarterly by the government agency, within 90 days of the date the government agency makes the information available to the public. The following table indicates the standard environmental record sources and the approximate minimum search distances for each.

Standard Environmental Record Sources	**Approximate Minimum Search Distance Per ASTM (miles)**
Federal NPL	1.0
Federal Delisted NPL	0.5
Federal CERCLIS	0.5
Federal CERCLIS NFRAP	0.5
Federal RCRA CORRACTS	1.0
Federal RCRA non-CORRACTS TSD	0.5
Federal RCRA Generators	Subject Site and Adjoining Properties
Federal IC/EC	Subject Site Only
Federal ERNS	Subject Site Only
State and Tribal Hazardous Waste Sites (NPL Equivalent)	1.0
State and Tribal Hazardous Waste Sites (CERCLIS Equivalent)	0.5
State and Tribal Landfill and/or solid waste disposal sites	0.5
State and Tribal LUST	0.5
State and Tribal Registered UST	Subject Site and Adjoining Properties
State and Tribal IC/EC	Subject Site Only
State and Tribal Voluntary Cleanup (VCP) Sites	0.5
State and Tribal Brownfield Sites	0.5

Based on our knowledge of the subject site and the surrounding area, ECS attempts to verify and interpret this data. While this attempt at verification is made with due diligence, ECS cannot guarantee the accuracy of the record(s) search beyond that of information provided by the regulatory report(s). Mapped and unmapped sites identified in the regulatory report(s) that are not subsequently addressed below were field verified and are not believed to be within the approximate minimum search distance and are excluded from this ESA report. ECS makes no warranty regarding the accuracy of the database report information included within the regulatory report(s).

5.1 Federal Databases

Federal National Priorities List (NPL)

The NPL is a subset of Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) and identifies “superfund” sites that have had documented contamination incidents.

The site was not identified on the NPL.

No off-site properties within the minimum search distance of inquiry were reported as being on the NPL.

Federal Delisted NPL

The Delisted NPL identifies sites previously listed on the NPL where no further response is appropriate.

The site was not identified on the Delisted NPL.

No off-site properties within the minimum search distance of inquiry were reported as being on the Delisted NPL.

Federal CERCLIS

CERCLIS contains data on potential hazardous waste sites that have been reported to the United States Environmental Protection Agency (USEPA). CERCLIS contains sites that are either proposed to or on the NPL and sites which are in the screening and assessment phase for possible inclusion on the NPL.

The site was not identified on the CERCLIS database.

No off-site properties within the minimum search distance of inquiry were reported as being on the CERCLIS database.

Federal CERCLIS No Further Remedial Action Planned (NFRAP)

CERCLIS sites designated as NFRAP have been removed from CERCLIS. NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require federal Superfund action or NPL consideration.

The site was not identified on the CERCLIS NFRAP.

One or more off-site properties within the minimum search distance of inquiry were reported as being on the CERCLIS NFRAP database.

One off-site property was identified within the 0.50-mile radius. "Wilson Boulevard Property" (3211 and 3237 Wilson Blvd), located approximately 0.45-miles to the east-southeast, is the identified property. According to available regulatory information, the site was placed on the NFRAP list in 1996. Given distance and regulatory status, this property is not expected to represent an environmental concern for the subject site.

Federal Corrective Action Report (CORRACTS)

CORRACTS identifies hazardous waste handlers that have been subject to corrective action under Resource Conservation and Recovery Act (RCRA).

The site was not identified by CORRACTS.

No off-site properties within the minimum search distance of inquiry were reported as being on CORRACTS.

Federal Resource Conservation and Recovery Information System (RCRIS) – Treatment, Storage and Disposal (TSD) Facilities

RCRIS identifies facilities that treat, store or dispose of hazardous wastes as defined by the RCRA. TSDs treat, store or dispose of hazardous waste.

The site was not identified as a hazardous waste TSD facility.

No off-site properties within the minimum search distance of inquiry were reported as being a hazardous waste TSD facility.

Federal RCRIS - Generators

RCRIS identifies facilities that generate hazardous wastes as defined by the RCRA. Conditionally exempt small quantity generators (CESQGs) generate less than 100 kilograms of hazardous waste, or less than 1 kilogram of acutely hazardous waste, per month. Small quantity generators (SQGs) generate between 100 and 1,000 kilograms of hazardous waste per month. Large quantity generators (LQGs) generate more than 1,000 kilograms of hazardous waste or more than 1 kilogram of acutely hazardous waste per month.

The site was identified as a hazardous waste generator.

One or more off-site properties within the minimum search distance of inquiry were reported as being a hazardous waste generator.

- **System Planning Corp (1425 N Quincy Street)** - A former occupant of the subject site; identified as a Small Quantity Generator (SQG) of hazardous wastes, such as ignitable wastes, corrosive wastes, reactive wastes, spent non-halogenated solvents, spent halogenated solvents, and wastewater treatment sludges. No violations under RCRA were identified. Previous reports identify 1425 N Quincy Street as the location of a radar assembly operation (ERC Environmental and Energy Services Company, Interim Report for 1425, 1429, 1495, and 1435 N Quincy Street, November 1989).

Two off-site RCRA Generator properties were identified within the 0.25-mile search radius. The nearest property is "Washington-Lee High School" (1300 N Quincy Street) located to the adjacent west-southwest and identified as a SQG of wastes such as lead, mercury, ignitable wastes, and corrosive wastes. No violations are recorded. It should be noted that listing on the RCRA database is not necessarily an indication that a problem exists, rather that the generator is following proper reporting procedures.

Federal Engineering Controls (EC) List

The Federal EC list identifies engineering controls including various forms of caps, building foundations, liners, and treatment methods used to eliminate pathways for regulated substances to enter environmental media or affect human health.

The site was not identified on the EC list.

Federal Institutional Controls (IC) List

The Federal IC list identifies institutional controls including administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants.

The site was not identified on the IC list.

Federal Emergency Response Notification System (ERNS)

The ERNS list is a national database that stores and records information on reported releases of hazardous substances, including petroleum products.

The site was not identified on the ERNS list.

5.2 State Databases

Leaking Underground Storage Tank (LUST) List

The LUST List is a record of reported leaking underground storage tank incidents that is maintained by the Virginia Department of Environmental Quality. This database search includes the LTANK database. The LUST List may also identify properties that have had soil and/or groundwater contamination associated with documented releases from aboveground storage tanks, surface spills and other sources.

The site was identified on the LUST list.

One or more off-site properties within the minimum search distance of inquiry were reported as being on the LUST list.

- **Cooper Quincy 66 Partnership (1439 N Quincy Street) -** On-site. LUST case number 90-0297 was opened in November 1989 and closed in September 1992. ECS was provided a Revised Site Characterization Report (SCR) prepared by Ogden Environmental and Energy Services, Co. (Ogden) in July 1992 by the current owner Mr. William Buck. In addition, ECS reviewed the case file at the Virginia Department of Environmental Quality's (VDEQ's) Northern Region Office in Woodbridge, Virginia. Information obtained in the Ogden report reveals that two 4,000-gallon USTs were excavated and removed from the subject site in August and September 1989. The tanks were located between 1435 and 1439 N Quincy Street. Arlington County Fire Department records indicated the tanks

were installed in 1953.

The Ogden report describes the history of the tank removal activities conducted at the site. Removal of a 4,000-gallon UST occurred on August 18, 1989. One soil sample obtained from the tank excavation and was found to contain a concentration of total petroleum hydrocarbons (TPH) of 170 parts per million (ppm) and non-detectable levels of BTEX. Given the TPH concentration, the State Water Control Board (SWCB) directed an additional two feet of soil be excavated. During this additional excavation, the second 4,000-gallon UST was discovered. This UST was removed September 29, 1989 and was found to be leaking free product upon removal. The report states that "after removal of all free product and additional soils", four soil samples were taken from second tank excavation. One of these samples contained a TPH concentration of 250 ppm. The other three samples contained TPH concentrations less than 5 ppm, the laboratory detection limit.

Site characterization activities by Ogden involved the installation of five soil test borings, two of which were converted into monitoring wells, in April 1992. Three monitoring wells were already in place at the site, installed in 1989. The wells were installed at depths between 27 and 40 feet below surface grade. Groundwater flow direction was determined to the northwest. Soils from the five borings were field screen using a Photoionization Detector (PID) device. Based on PID results, soil samples were selected for laboratory analysis. Laboratory analysis revealed a maximum TPH soil concentration of 63 ppm at 20-22 feet below grade at MW-5. Groundwater samples collected from the monitoring wells in April 1992 indicated results below laboratory detection limits for TPH and BTEX.

Given the surrounding land use and a lack of sensitive receptors, Ogden recommended no further remediation of the subject site. The Virginia State Water Control Board granted LUST case closure via a letter dated September 25, 1992. A copy of this letter is provided in Appendix III.

Seventeen off-site LUST case properties were identified by the database report within the 0.50-mile radius. However, only one of these off-site properties is located within an approximate 0.125-mile (1/8th-mile) radius. This property is identified "Zeibe, Carl Residence" at 3408 N 17th Street, located approximately 0.10-miles to the north-northeast in an up-gradient topographic position. This property is on the far side of Route 66. In addition, the case was opened in August 1999 and closed shortly thereafter in October 1999. The contaminant of concern is listed as heating oil. In light of this information, this property is not expected to represent an environmental concern for the subject site.

Following review of the remaining LUST case sites, none are expected to represent an environmental concern given distance and/or topographic position or regulatory status.

Leaking Tanks (LTANKS)

The LTANKS database tracks all reported petroleum releases from aboveground and underground storage tanks in Virginia. Some LTANKS listings may be duplicate listings of sites on the LUST database.

The site was identified on the LTANKS database.

One or more off-site properties within the minimum search distance of inquiry were reported as being on the LTANKS database.

The subject site and 25 off-site properties were identified by the database report. The subject site's listing on the LTANKS list is a duplicate listing from the LUST database. LUST PC# 90-0297 for the subject site is discussed in the LUST section above. Most of the off-site listings are also duplicates from the LUST database. One non-duplicate property was identified within a 0.125-mile radius. "Schum Brady Residence" at 3500 14th Street N is identified with one LTANKS case from August 2001 (PC#20023052). The case has since been closed. Given distance and case closure, this property is not expected to represent an environmental concern for the subject site.

State Responsible Party Voluntary Action (VRP) Sites

The VRP Database is a listing of sites that parties wish to remediate voluntarily. The program is administered by the Virginia Department of Environmental Quality Voluntary Remediation Program.

The site was not identified on the VRP Sites listing.

No off-site properties within the minimum search distance of inquiry were reported as being on the VRP Sites listing.

Registered Underground Storage Tank (UST) List

The Registered UST List inventories underground storage tanks registered with the Virginia Department of Environmental Quality. This list does not identify USTs that have not been registered with the Virginia Department of Environmental Quality, such as home heating oil tanks and other unregulated tanks.

The site was identified on the UST database.

One or more off-site properties within the minimum search distance of inquiry were reported as being on the UST database.

- **Cooper Quincy 66 (1439 N Quincy Street) -** The subject site; listed with one 4,000-gallon diesel UST described as closed in ground. As evidenced in previous reports prepared for the subject site, two 4,000-gallon USTs have been excavated and removed at the site. The tanks were located between the buildings addressed as 1435 and 1439 N Quincy Street. Per a Site Characterization Report (SCR) prepared by Ogden Environmental and Energy Services Co. in July 1992, minor petroleum impact was identified in a soil sample northwest (down-gradient) of the tank field. Impact to groundwater was not identified during a sampling event of 5 groundwater monitoring wells in 1992. The former presence of petroleum storage tanks is considered a Historic Recognized Environmental Condition (HREC) for the subject site.

Seven off-site UST properties were identified within the 0.25-mile search radius. The nearest properties are Washington Lee High School (1300 N Quincy Street) and Arlington Focus/Page Elementary School (1501 N Lincoln Street). Both school facilities are identified with heating oil tanks which have either been removed from the ground or

closed in place. Following review of the remaining UST properties, none are expected to represent an environmental concern for the subject site.

Virginia Spills (VA SPILLS)

The Virginia pollution complaint database (Updated quarterly) includes complaints or reports of chemical spills to the ground or water received by the Virginia Department of Environmental Quality between 1986 and December 1993. The database may also include some leaking UST incidents.

The site was not identified on the VA SPILLS/RELEASES database.

Registered Aboveground Storage Tank (AST) List

The Registered AST List inventories aboveground storage tanks registered with the Virginia Department of Environmental Quality. This list does not identify ASTs that have not been registered with the Virginia Department of Environmental Quality, such as home heating oil tanks and other unregulated tanks.

The site was not identified on the AST database.

No off-site properties within the minimum search distance of inquiry were reported as being on the AST database.

State Solid Waste Facilities/Landfill (SWL) List

The Virginia Department of Environmental Quality maintains a list of permitted solid waste facilities. These facilities may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

The site was not identified on the SWL list.

No off-site properties within the minimum search distance of inquiry were reported as being on the SWL list.

State Brownfield Projects Inventory (Brownfields)

The State Brownfield Database identifies brownfield projects inventoried with the Virginia Department of Environmental Quality. To qualify for Brownfields Assessment, the site must meet the Federal definition of a Brownfields and should have contaminant issues that need to be addressed and a redevelopment plan supported by the local government and community. The VDEQ performs brownfields assessments under a cooperative agreement with the US EPA with no cost to communities, property owners, or prospective purchasers. The assessment is an evaluation of environmental impacts caused by previous site uses similar to a Phase II ESA.

The site was not identified on the State Brownfield database.

No off-site properties within the minimum search distance of inquiry were reported as being on the State Brownfield database.

5.3 Historical Use Information

Sanborn Fire Insurance Map Review

In an effort to identify past uses, ECS reviewed Historic Sanborn™ Fire Insurance Maps (Sanborns) obtained through EDR for information regarding the site and surrounding area. Sanborns dated 1936, 1959,and 1963 provided coverage of the site area. A copy of the EDR Certified Sanborn Map Report is included in Appendix IV. The following is a description of relevant information from the Sanborns:

1936 Sanborn Map

The western portion of the site is labeled "Consolidated Terminal Corporation". A rail trestle from the northern adjacent rail lines (in the place of Route 66) extends over the western portion of the site. Spout Run is illustrated through the center of the site. Few outbuildings, labeled as wine storage, an office, and scales, are located on the northwest corner of the site. A coal yard is labeled on-site. The eastern portion of the site contains few residential dwellings. Surrounding properties contain few single family homes.

1959 Sanborn Map

A warehouse type building has been constructed near the center of the site at the location of 1429 N Quincy Street. This building is addressed as 3801 14th Street N and is labeled a sheet metal shop and roofing material warehouse. The far western portion of the subject site appears to be improved by a building in the same configuration and location as the current 1439 N Quincy Street building. This building is labeled storage warehouse and auto repair operation. A structure labeled "mill working" is west of this building, beyond N Nelson Street, which extends through the site to the northern adjacent rail lines. The coal yard and outbuildings on the eastern/northeastern portion of the site remain in place.

To the west beyond N Quincy Street, a building labeled "Board of Education" has been constructed. A piece of land to the north beyond the rail lines is labeled to contain 5 fuel oil tanks, coals bins, a building material warehouse, and a garage structure. Another property to the north is labeled the "Cherrydale Cement Block Co". To the south, increased single family home development has occurred since the 1936 map. Coverage of properties to the west is not available from this map.

1963 Sanborn Map

The current warehouse building at 1425 N Quincy Street has been constructed and is labeled a bowling alley. A construction date of 1960 is denoted. The rail trestle, coal yard, and outbuildings seen on this portion of the site in earlier Sanborns are no longer present. The sheet metal/roofing material warehouse remains in place. The building at 1435 N Quincy Street is illustrated and labeled as a commercial storage warehouse, with a construction date of 1960.

Changes to surrounding properties from the 1959 map were not noted.

Aerial Photograph Review

ECS reviewed aerial photographs of the site and immediately surrounding properties for evidence of former usage which may indicate potential environmental issues. The aerial photographs were obtained from the Arlington County GIS Public Maps Gallery website. The aerial photographs reviewed were dated 1934, 1949, 1962, 1967, 1974, 1977, 1983, and 1989. Aerial photographs dated prior to 1934 were not available for review from this source. The ECS review is dependent on the quality and scale of the photographs.

1934 Aerial Photograph

Two structures are seen at the northwest corner of the site, adjacent to the rail lines to the north and N Quincy Street to the west. A rail trestle extends over the western portion of the subject site from the northern adjacent rail lines. Vehicles are parked on either side of the trestle. A creek or stream is present through the site, flowing to the east. What appears to be a small retention pond is on the eastern portion of the site. Homes are to the south along 14th Street N.

1949 Aerial Photograph

A warehouse type building has been constructed on the subject site, in the approximate location of the current building at 1429 N Quincy Street. Earth moving and construction type activities appear on the eastern portion of the subject site. The rail trestle and buildings on the western portion of the site remain. A darkened area is evident on the east side of the rail trestle. Per Sanborn maps, this area was used as a coal yard. Industrial type operations are to the north beyond the railroad.

To the west, the original Washington-Lee High School and administrative buildings have been constructed.

1962 Aerial Photograph

The site is improved with four buildings, appearing to be the current buildings located on-site. The site appears unpaved between the buildings addressed as 1429 and 1435 N Quincy Street. Access to the two eastern buildings appears to be from N Nelson Street. Large trucks are around the eastern most building, 1439 N Quincy Street. The density of single family homes has increased to the south and far north. The industrial operations to the north remain.

1967 Aerial Photograph

The site appears to be consistent with the previous aerial photograph. Many of the industrial buildings to the north have been cleared.

1974 & 1977 Aerial Photographs

The site appears to be consistent with the previous aerial photograph. The rail lines have been cleared to the north. The park and tennis courts to the adjacent east appear in their current configuration. Many large trucks surround the two eastern buildings.

1983 & 1989 Aerial Photographs

The site appears to be consistent with the previous aerial photograph, though operations out of 1429 N Quincy appear to have ceased by the 1983 aerial photograph. By 1983, Route 66 has been constructed to the north, as well as the N Quincy Street overpass to the adjacent northwest. The area north of Route 66 has been converted into a trail with open space and retention ponds.

In the 1989 aerial photograph, the site appears in its current configuration, with access to the entire site from N Quincy Street.

City Directory Review

One of the ASTM standard historic sources to be reviewed for previous site use are local street directories, commonly known as City Directories. The purpose of the directory review is to identify past occupants of the site, adjoining properties, or nearby properties. In some rural areas, street directories information is limited.

ECS reviewed a City Directory Abstract Report obtained from Environmental Data Resources, Inc. (EDR). The directories included in the abstract were dated 1955, 1961, 1964, 1966, 1969, 1971, 1984, 1989, 1994, 2003, 2008, and 2013. Directories dated prior to 1955 were not available for review from this source. The site addresses utilized for the research were 1423, 1429, 1435, and 1439 N Quincy Street.

Subject Site

1423 N Quincy Street is listed as "Vacant" in the 1955 and 1961 directories and as "Skor Mor Lanes Bowling" in the 1964, 1966, and 1969 directories.

1425 N Quincy Street is listed as "Advanced Technology Integration Systems, Inc." or a similar variation in the directories dated 1969 and 1994. The 2013 directory lists "System Planning Corporation" at this address.

1429 N Quincy Street is listed as "Perrin & Martin Sheet Metal" and "Washington Old Dominion RR Crossing" or similar variations in the 1955, 1961, 1964, 1966, and 1969 directories. In the 1984 directory, 1429 N Quincy Street is listed as "Capital City Area Bus Parts & Service", "Bernard Gratzl", "Jonkers Company", and "World Reservation Information". In the 1989 directory, 1429 N Quincy is is listed as "World Reservation" and "Washington Liasion". The 1994 directory lists "Interex Systems", the 2003 directory lists "System Planning Corporation", and the 2008 directory lists "Connectivity Resource, Inc" and "Darlington, Inc" for 1429 N Quincy Street.

1435 N Quincy Street is listed in the 2003 directory as "Arl Health Foundation". No other years provided listings for 1435 N Quincy Street.

Nearby Properties

Surrounding properties are generally listed as private residences. The western adjacent addresses 1426 and 1300 N Quincy Street are listed as "Arlington County School District", "Arlington County Education Center", "Arlington Recreation Center" or a similar variation in the reviewed directories, with the exception of the 1955 directory, when 1426 N Quincy Street is listed as "Eisenhart Ice Cream Co./Sunfreeze Frozen Food Co".

An address to the north, 1500 N Quincy Street (located beyond the former W&OD Railroad/I-66) is listed as "A/C Co Oil", "Association of Petroleum Refiners", or a similar name in directories dated 1961, 1964, 1966, 1969, and 1971. Listings after 1971 were not available for this address.

Other Standard Historical Sources

In accordance with the ASTM Standard, other historical sources should be reviewed, if necessary and if the information is likely to be useful, to obtain historical site use information. Other Standard Historical Sources may include property tax files, recorded land title records, historic USGS topographic maps, building department records, and zoning or land use records.

ECS reviewed the on-line Arlington County Department of Real Estate Assessment database to obtain information regarding the site. According to the tax assessor on-line information, the four parcels comprising the subject site are owned by Cooper Quincy LLC, Cooper Quincy No 1 LLC, or Cooper Quincy No 2 LLC. The aggregate site area is approximately 6-acres. The parcels are identified as Arlington County RPC numbers 15-040-045, 15-040-046, 15-040-047, and 15-040-048. Copies of the Arlington County Real Estate Assessment information for each parcel is provided in Appendix IV.

Other Local Historical Sources

Other credible historical sources may be reviewed to identify past uses of the site. These sources may include internet sites, county or State road maps, historical society documents, or local library information.

The historical documents reviewed and reported previously in this section are those that were reasonably ascertainable at the time of this assessment; therefore, no additional historical research was conducted.

Freedom of Information (FOIA) Requests

Frequently to obtain information regarding agency records, a Freedom of Information Act (FOIA) request must be submitted. Depending on the locale, agencies may or may not respond to requests.

The Virginia Department of Environmental Quality (VDEQ) was contacted to determine if they had any records regarding environmental concerns at the site. A response received from the VDEQ stating that no pertinent records were found.

ECS conducted an in-person file review at the VDEQ for the LUST case identified for the subject site, as discussed in Section 5.2.

Arlington County was contacted to determine if they had any historical information or records regarding environmental concerns in connection with the subject site. Arlington County processes FOIA requests for all departments through a single point of contact. No information has been received at the time of the report completion. If any information is received that changes the conclusions or recommendations of this report, ECS will forward the information to the Client.

Historical Summary

According to historical research, the site has been used as a coal yard, sheet metal warehouse, roofing material warehouse, bowling alley, tour bus company and associated auto repair operation, radar production and testing, a USPS facility, clerical offices, and gyms. The area has developed slowly from industrial use in connection with the former northern adjacent Washington & Old Dominion (W&OD) railroad to primarily residential use. The subject site was identified on the EDR Regulatory Radius Report as the location of a Leaking UST (LUST) case and Registered UST. A former occupant (Systems Planning Corporation) was identified on the RCRA Generators database. ECS has reviewed the LUST case file at VDEQ's Northern Region Office. The file included a Site Characterization Report (SCR) by Ogden Environmental & Energy Services (Ogden) in July 1992, which was also provided to ECS by the current owner Mr. William Buck. Information contained in the case file indicates two 4,000-gallon USTs were removed from the ground between 1435 and 1439 N Quincy Street in 1989. Two of five soil samples collected from the tank excavation following tank removal contained total petroleum hydrocarbons (TPH) above the regulatory limit of 100 parts per million (ppm). As a result, the State Water Control Board opened a LUST case for the subject site.

The Ogden SCR involved the installation of five soil test borings, two of which were converted into monitoring wells (MWs), in April 1992. Three MWs were already in place at the site, installed in 1989. The MWs were installed at depths between 27 and 40 feet below surface grade. Groundwater flow direction was determined to the northwest. Soils from the five borings were field screen using a Photoionization Detector (PID) device. Based on PID results, soil samples were selected for laboratory analysis. Laboratory analysis revealed a maximum TPH soil concentration of 63 parts per million (ppm) at 20-22 feet below grade at MW-5. Groundwater samples collected from the monitoring wells revealed results below laboratory detection limits for TPH and BTEX. Given the surrounding land use and a lack of sensitive receptors, Ogden recommended no further remediation of the subject site. The Virginia State Water Control Board granted LUST case closure via a letter dated September 25, 1992. A copy of this letter is provided in Appendix III. The on-site LUST case is considered a Historic Recognized Environmental Condition (HREC) for the subject site. While no further investigation is warranted in connection with the LUST case at this time, it is possible residual contamination exists in the subsurface.

Data failures (historical data gaps) were identified during the historical research of this site. Use of the site was generally documented back to 1934. Historical information was missing for various periods. However, due to the historical information obtained about the site from Sanborn Fire Insurance Maps, historic aerial photographs, previous reports, and interviews; the historical data gaps are not expected to impact our ability to render a professional opinion regarding the subject site. No other data gaps were identified.

6.0 SITE AND AREA RECONNAISSANCE

6.1 Methodology and Limiting Conditions

Elizabeth Boone of ECS conducted the field reconnaissance on January 26, 2015. The weather at the time of the reconnaissance was approximately 35 degrees Fahrenheit and lightly precipitating. Observations were made from a walking reconnaissance around the perimeter, around the buildings, through the buildings, and along several transects across the subject site. ECS was escorted by Ray with Buck & Associates Realty. Ray has been involved with the property maintenance for the past 11 years. Site photographs are included in Appendix V.

6.2 On-Site Features

As observed during the site reconnaissance, the irregularly shaped subject site contains approximately 6-acres. The site is improved with four buildings. The site is provided natural gas, electric, municipal water and sanitary sewer services. With the exception of a below ground utility and elevator room in 1429 N Quincy Street, the buildings are at-grade.

1425 N Quincy Street
This one-story building is partially occupied by NOVA MMA, a martial arts and athletic training gym. Prior to NOVA MMA, the building was reportedly occupied by the Army. The eastern half of the building contains open warehouse space, used by Buck & Associates Realty for storage. The building is heated and cooled with electric rooftop units. Electrical supply appeared to be from pole-mounted units running along N Quincy Street.

1429 N Quincy Street
This three-story office building has reportedly been vacant for approximately five years. Prior, the site was occupied by ITT Corporation. ITT Corporation occupied the site for approximately 5 years. The building is serviced by one hydraulic elevator. The elevator machine room is located in a basement utility room. The machine appeared in good condition with no evidence of releases of hydraulic fluid. One emergency generator was observed in a fenced area just east of the building. The generator is reportedly diesel fueled and was owned and maintained by ITT. The tank is belly-mounted and within secondary containment. No evidence of releases or leaks from the generator were noted. A pad mounted transformer was observed east of the building and labeled "Non PCB".

1435 N Quincy Street
This one-story warehouse building is occupied by Dynamics Gymnastics. The building contains a main gym floor, offices, locker rooms, and a party room. Prior to Dynamics Gymnastics, the building was reportedly used by the U.S. Postal Service. A loading dock area on the northern side of the building contains a hydraulic platform lift.

1439 N Quincy Street

This three-story office building has reportedly been vacant for approximately 3 years. Prior, the site was occupied by administrative offices for Arlington County Public Schools. The building is serviced by one hydraulic elevator. The elevator machine was observed on the lower level. The machine appeared in good condition with no evidence of releases of hydraulic fluid.

Underground or aboveground storage tanks

The following observations were made with regard to aboveground storage tanks and/or underground storage tanks at the site:

- The site contains one emergency generator, located east of 1429 N Quincy Street. The generator reportedly contains a belly-mounted diesel fuel tank within secondary containment. The generator was installed and maintained by the former occupant of the building, ITT.

Strong, pungent or noxious odors

We did not notice strong, pungent or noxious odors at the site.

Surface waters

We did not observe streams or other surface waters located on the site.

Standing pools of liquid likely containing petroleum or hazardous substances

We did not observe standing pools of liquid at the site.

Drums or containers of petroleum or hazardous substances greater than five-gallons

We did not observe drums or containers of petroleum or hazardous substances greater than five-gallons at the site.

Drums or containers of petroleum or hazardous substances less than or equal to five-gallons

The following observations were made:

- Containers five-gallons or less of typical maintenance and cleaning materials such as paints and primers were observed throughout the site.

Unidentified opened or damaged containers of hazardous substances or petroleum products

We did not observe unidentified opened or damaged containers of hazardous substances or petroleum products at the site.

Known or suspect PCB-containing equipment (excluding light ballasts)

We did not observe known or suspect PCB-containing equipment on the site.

Stains or corrosion to floors, walls or ceilings

We did not observe stains or corrosion to floors, walls or ceilings.

Floor drains and sump pumps

We did not observe floor drains or sump pumps at the site.

Pits, ponds or lagoons

We did not observe pits, ponds or lagoons at the site.

Stained soil or pavement

We did not observe stained soils or pavement at the site.

Stressed vegetation

We did not observe stressed vegetation at the site.

Solid waste mounds or non-natural fill materials

We did not observe solid waste mounds or non-natural fill materials at the site.

Wastewater discharges into drains, ditches or streams

We did not observe wastewater discharges at the site.

Groundwater wells including potable, monitoring, dry, irrigation, injection and/or abandoned

We did not observe groundwater wells at the site.

Septic systems or cesspools

We did not observe evidence of septic systems or cesspools on the site.

Elevators

The following observations were made:

- The buildings addressed as 1429 and 1439 N Quincy Street are each serviced by one hydraulic elevator. The elevator machines appeared in good condition with no evidence of releases or leaks.

Dry Cleaning

We did not observe dry-cleaning operations on the site.

Onsite Emergency Electrical Generators

The following observations were made:

- The site contains one emergency generator, located east of 1429 N Quincy Street. The generator reportedly contains a belly-mounted diesel fuel tank within secondary containment. The generator was installed and maintained by the former occupant of the building, ITT.

Specialized industrial equipment (paint booths, bag houses, etc.,) on-site

We did not observe specialized industrial equipment at the site.

Hydraulic lifts

The following observations were made:

- One hydraulic load leveling lift was observed on the north side of 1435 N Quincy Street.

Oil-water separators

We did not observe oil-water separators at the site.

Compressors on-site

We did not observe compressors at the site.

Grease traps

We did not observe grease traps at the site.

6.3 Adjoining and Nearby Properties

Contiguous and nearby properties were observed during a walking and vehicular reconnaissance of the site boundary and public places. The site is located in a residential area of Arlington, Virginia.

The site is bounded on the north by Route 66 beyond a steep slope. Areas farther north contain the Custis Trail and residential proprieties. The site is bounded on the east by N Quincy Street. Areas farther east contain an administrative building for Arlington County Public Schools, a planetarium for Arlington County Public Schools, and Washington-Lee High School. The site is bounded on the south by single family homes along 14th Street N, N Nelson Street, and N Monroe Street. Areas farther south also contain single family homes. The site is bounded on the west by Hayes Park with N Lincoln Street and Arlington Science Focus Elementary School beyond. None of the adjacent properties observed during our site reconnaissance are expected to represent an environmental concern for the subject site.

6.4 Summary of On-Site and Off-Site RECs

According to our site observations and a review of adjoining and nearby properties, the site has most recently been utilized for clerical office use and recreational gym use. The site is located in a residential area of Arlington, Virginia. Details pertaining to our on-site and off-site observations are referenced previously. We did not identify on-site or off-site recognized environmental conditions associated with the site during the reconnaissance.

7.0 ADDITIONAL SERVICES

7.1 Non-Scope Issues

ASTM guidelines identify non-scope issues, which are beyond the scope of this practice. Non-scope issues have the potential to be business environmental risks. Some of these non-scope issues include; asbestos-containing building materials, radon, lead-based paint, lead in drinking water, wetlands and mold.

We were not authorized to conduct non-scope services for the site.

7.2 Previous Reports Review

We have not conducted previous environmental and/or engineering assessment activities at the site.

We were provided with the following environmental and/or engineering assessment report(s) completed by others:

- **Ogden Environmental and Energy Services, Co., Revised Site Characterization Report, Cooper Quincy 66, 1435 & 1439 N Quincy Street, Arlington VA. July 1992 -** The report describes the history of the tank removal activities conducted at the site as well as site characterization activities performed to assess site conditions in connection with LUST PC#90-0297. Removal of a 4,000-gallon UST occurred on August 18, 1989. One soil sample obtained from the tank excavation and was found to contain a concentration of total petroleum hydrocarbons (TPH) of 170 parts per million (ppm) and non-detectable levels of BTEX. Given the TPH concentration, the State Water Control Board (SWCB) directed an additional two feet of soil be excavated. During this additional excavation, the second 4,000-gallon UST was discovered. This UST was removed September 29, 1989 and was found to be leaking free product. The report states that "after removal of all free product and additional soils", four soil samples were taken from second tank excavation. One of these samples contained a TPH concentration of 250 ppm. The other three samples contained TPH concentrations less than 5 ppm, the laboratory detection limit.

  Site characterization activities by Ogden involved the installation of five soil test borings, two of which were converted into monitoring wells, in April 1992. Three monitoring wells were already in place at the site, installed in 1989. The wells were installed at depths between 27 and 40 feet below surface grade. Groundwater flow direction was determined to the northwest. Soils from the five borings were field screen using a Photoionization Detector (PID) device. Based on PID results, soil samples were selected for laboratory analysis. Laboratory analysis revealed a maximum TPH soil concentration of 63 ppm at 20-22 feet below grade at MW-5. Groundwater samples collected from the monitoring wells in April 1992 indicated results below laboratory detection limits for TPH and BTEX. Given the surrounding land use and a lack of sensitive receptors, Ogden recommended no further

remediation of the subject site. The Virginia State Water Control Board granted LUST case closure via a letter dated September 25, 1992. A copy of this letter is provided in Appendix III.

- **ERC Environmental and Energy Services Co., Interim Report Real Property Preconveyance Documentation for 1425, 1429, 1435, and 1439 N Quincy Street, Arlington VA, November 1989 -** This document was found in the VDEQ's LUST case file for the subject site. A section of this report named "Historical Land Ownership and Use" states that through deed records, historical maps, and conversations with Mr. John Rutledge, who had been familiar with the site (as attorney for for owner Mr. Ben Cooper) since 1950, historical use of the property was as follows:

  "The property housed a company called Virginia Ice and Fuel in the early 1920's. Consolidated Terminal Corporation occupied the site in the 1930's. A 1936 Sanborn Fire Insurance Map shows an ice plant and coal yard on the property as well as the presence of a trestle leading to the W&OD Railroad which was adjacent to the site at the time. The 1954 Sanborn Fire Insurance Map shows a building which houses a roofing material storage area and a sheet metal shop. Adjacent to this building is a concrete manufacturing operation. According to Mr. Rutledge, the building housing the M.W. Martin Brothers, Inc. roofing and sheet metal business was built in 1949. The trestle shown on the 1936 [Sanborn] map is also present on the 1954 [Sanborn map] as is the coal yard. A cabinet shop is shown on the property at this time as well. In the 1950's, according to Mr. Rutledge, the buildings were leased to a Newlons Moving Company, and in the early 1980's the site was used by Creative Bus Tours."

At the time of this report, all four buildings were used by Systems Planning Corporation, which assembled radar systems for the U.S. Government. No heavy manufacturing was noted on-site at the time of this assessment.

8.0 INTERVIEWS

Basic site information was provided by Mr. Tim O'Hora with Arlington County. On the day of the site reconnaissance, questions were answered by Ray with Buck & Associates Realty. Ray has approximately 11 years of experience in connection with the subject site. He had no knowledge of environmental concerns in connection with the subject site. Additional information obtained during the site reconnaissance is found in pertinent sections of this report. ECS was provided a Site Characterization Report by Mr. William Buck, owner of the site, which describes the removal of two USTs from the subject site, and follow-up sampling as required by the State Water Control Board.

ECS submitted a Freedom of Information Act (FOIA) request to Arlington County requesting files in connection with environmental concerns, responses, or cleanups which have occurred at the subject site. ECS received a letter from the Arlington County FOIA official that no pertinent files exist. A copy of this letter is provided in Appendix III.

9.0 FINDINGS AND OPINIONS

The subject site is located at 1423-1439 N Quincy Street, Arlington, Virginia. The site is identified as Arlington County RPC Numbers 15-040-045, 15-040-046, 15-040-047, and 15-040-048. The approximately 6-acre subject site is currently occupied by NOVA MMA, a martial arts gym, and Dynamics Gymnastics. At the time of our site reconnaissance, the subject site was developed with four structures- two one-story warehouse type buildings (1423-25 and 1435 N Quincy Street) and two three-story office buildings (1429 and 1439 N Quincy Street). The site is located in an area that can generally be described as residential. The site is serviced by natural gas, electric, and municipal water and sanitary sewer services. The buildings are heated via electric roof-mounted units. One out of service, diesel fueled emergency generator was observed along the eastern side of 1429 N Quincy Street. The generator was installed and maintained by a former tenant, ITT Corporation.

The site is located in a residential area of Arlington, Virginia. The site is bounded on the north by Interstate 66 beyond a steep slope. Areas farther north contain the Custis Trail and residential properties. The site is bounded on the east by N Quincy Street. Areas farther east contain an administrative building for Arlington County Public Schools, a planetarium for Arlington County Public Schools, and Washington-Lee High School. The site is bounded on the south by single family homes along 14th Street N, N Nelson Street, and N Monroe Street. Areas farther south also contain single family homes. The site is bounded on the west by Hayes Park with N Lincoln Street and Arlington Science Focus Elementary School beyond. None of the adjacent properties observed during our site reconnaissance are expected to represent an environmental concern for the subject site. We did not identify adjoining or nearby properties that are considered to present a REC for the site.

Based on the records search, site reconnaissance and interviews, it appears that the site was improved with a rail trestle and associated coal yard from at least 1934 until approximately 1959. A sheet metal warehouse was constructed at the site circa 1959, at the location of 1429 N Quincy Street. A storage warehouse and auto repair shop was constructed circa 1959 at the location of 1439 N Quincy Street. A warehouse was constructed circa 1960 at 1435 N Quincy Street. According to city directories, previous reports reviewed as part of this assessment, and interviews, former occupants of the on-site buildings include: a sheet metal and roofing operation, a tour bus company and bus repair operation, a bowling alley, a radar production and testing operation, a USPS facility, clerical offices, and gyms. Historical records prior to 1934 were not reasonably ascertainable for the site. For more discussion of historical records, see Section 5.4.

Our review of historical information for adjoining or nearby properties identified the site area was originally industrial in connection with the former Washington & Old Dominion Railroad (W&OD), which transitioned to residential development over time. Our historical review did not identify adjoining or nearby properties that are considered a REC for the site.

A regulatory database search report was provided by Environmental Data Resources, Inc. (EDR). The EDR report identifies the subject site on environmental regulatory databases. The subject is identified on the Registered UST and Leaking UST (LUST) case as “Cooper Quincy 66 Partnership” (1439 N Quincy Street), and RCRA Generators database as “Systems Planning Corporation” (1425 N Quincy Street).

ECS reviewed the LUST case file at VDEQ's Northern Region Office. The file included a Site Characterization Report (SCR) prepared by Ogden Environmental & Energy Services (Ogden) in July 1992, which was also provided to ECS by the current owner Mr. William Buck. Information contained in the case file indicates two 4,000-gallon USTs were removed from the area between 1435 and 1439 N Quincy Street in 1989. Two of five soil samples collected from the tank excavation following tank removal contained total petroleum hydrocarbons (TPH) above the regulatory limit of 100 parts per million (ppm). As a result, the State Water Control Board opened a LUST case for the subject site. The SCR involved the installation of five soil test borings, two of which were converted into monitoring wells (MWs), in April 1992. Three MWs were already in place at the site, installed in 1989. The MWs were installed at depths between 27 and 40 feet below surface grade. Groundwater flow direction was determined to the northwest. Soils from the five borings were field screen using a Photoionization Detector (PID) device. Based on PID results, soil samples were selected for laboratory analysis. Laboratory analysis revealed a maximum TPH soil concentration of 63 parts per million (ppm) at 20-22 feet below grade at MW-5, northwest of the former tank pit. Groundwater samples collected from the MWs revealed results below laboratory detection limits for TPH and BTEX. Given the surrounding land use and a lack of sensitive receptors, Ogden recommended no further remediation of the subject site. The Virginia State Water Control Board granted LUST case closure via a letter dated September 25, 1992. A copy of this letter is provided in Appendix III.

The EDR report identified few off-site properties within the minimum ASTM search distances. Based on our review of available public records, their distances, groundwater flow direction inferred from surface topography or regulatory status of these facilities, none of the off-site facilities represent a REC for the subject site.

No significant data gaps are identified. Also, no de minimis conditions were observed.

We have performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Standard E 1527-13 of the N Quincy Street Office Park located at 1423-1439 N Quincy Street, Arlington, Virginia. Exceptions to, or deletions from, this practice are described in Section 2.3 of this report. This assessment has revealed no evidence of recognized environmental conditions in connection with the property, with the exception of the following:

- A western portion of the site was used as a rail trestle and coal yard from at least 1934 until approximately 1959. It is possible residual contamination resulting from these activities remains in the subsurface.

ECS has identified the following historic recognized environmental condition (HREC) item:

- LUST PC#90-0927 was opened at the subject site in 1989 during removal of two 4,000-gallon USTs located between 1435 and 1439 N Quincy Street. The case has since been closed. While no further investigation in connection with this LUST case is warranted at this time, it should be noted that residual contamination may remain in place.

ECS has identified the following business environmental risk (BER) item:

- Given the age of the structures, it is possible asbestos containing materials (ACMs) and/or lead-based paints are present in the buildings.

10.0 REFERENCES

ASTM, 2013. ASTM Standards on Environmental Site Assessments for Commercial Real Estate. ASTM E 1527-13. Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.

EDR, Inc., August 2006. Phase I Environmental Site Assessment, Loudon Parkway Center- South. ECS Project # 4153-C3 South

Johnson, Paul M., 1964. *Geology and Ground-Water Resources of Washington, D.C. and Vicinity*, Geological Survey Water-Supply Paper 1776, US Government Printing Office Washington.

InfoMap Technologies Inc., August 2011. Environmental FirstSearch Radius Report, Barrister Street, Ashburn VA 20148.

Loudon County GIS and Mapping Department,
http://logis.loudoun.gov/weblogis/

USGS 1994. Topographic Map, 7.5 Minute Series, Sterling Quadrangle, Virginia. Scale, 1" = 2,000'. Contour interval 10'.

This Phase II Environmental Site Assessment Report provided is limited to the information related to Borings #2 and #3. The entire Phase II report is available upon request.

PHASE II ENVIRONMENTAL SITE ASSESSMENT
N QUINCY STREET OFFICE PARK
1425-1439 N QUINCY STREET
ARLINGTON, VIRGINIA

ECS PROJECT NO. 01:23933-A

FOR

ARLINGTON COUNTY ENVIRONMENTAL SERVICES

APRIL 15, 2015

April 15, 2015

Mr. Tim O'Hora
Arlington County Environmental Services
Engineering & Capital Projects Division
2100 Clarendon Blvd, Suite 800
Arlington, VA 22201
VIA EMAIL: thora@arlingtonva.us

ECS Project No. 01:23933-B

Reference: Phase II Environmental Site Assessment, N Quincy Street Office Park, 1423-1439 N Quincy Street, Arlington, Arlington County, VA 22201

Dear Mr. O'Hora:

ECS Mid-Atlantic, LLC (ECS) is pleased to provide Arlington County Environmental Services with the results of the referenced Phase II Environmental Site Assessment. Our services were provided in accordance with ECS Proposal No. 50256-EP, dated February 17, 2015.

BACKGROUND

The property, also referred to as "subject site", "site" or "subject", is located northeast of the intersection of N Quincy Street and 14th Street N in Arlington, Virginia. The site consists of four parcels of land with a total area of approximately six acres. The parcels are identified as Arlington County RPC Numbers 15-040-045, 15-040-046, 15-040-047, and 15-040-048. The site is improved with asphalt-paved parking areas and four detached buildings, addressed as 1425, 1429, 1435, and 1439 N Quincy Street. Two of the buildings, 1429 and 1439 N Quincy Street, are currently unoccupied. 1425 N Quincy Street is occupied by a martial arts gym and 1435 N Quincy Street is occupied by a gymnastics studio.

ECS recently performed a Phase I Environmental Site Assessment of the subject site (ECS Project No. 23933). The presence of a rail trestle and coal yard on the property from at least 1934 until approximately 1959 was considered a recognized environmental condition (REC) for the subject site, given the possibility of residual contamination from these activities. In addition, a leaking underground storage tank (LUST) case opened at the subject site in 1989 during the removal of two 4,000-gallon USTs was considered a historic recognized environmental condition (HREC).

Based on the results of the Phase I ESA, Arlington County Environmental Services requested a Phase II ESA to determine if residual contamination was present at the site from the former activities.

SAMPLING METHODOLOGY

A total of 10 borings were advanced across the property using a truck-mounted Geoprobe. The Geoprobe uses a hydraulic hammer to push a macrocore steel rod with a polyethylene sleeve into the ground in four-foot increments. The macrocore is then withdrawn from the ground and the sleeve removed containing a relatively undisturbed soil core. The sleeve is cut open allowing examination and sampling of soil from the core sample.

The borings were advanced to depths ranging from 9 to 19.5 feet below surface grade at which point saturated conditions or auger refusal was encountered. A boring location map is included as Appendix I. Samples were collected at two-foot intervals throughout the depth of each boring. Each soil sample was then field screened using a portable photoionization detector (PID) to detect volatile organic compounds (VOCs). The boring logs are included here as Appendix II. In general, soils across the site generally consisted of shallow fill material and clayey sand or silty sand below the surficial fills. A layer of dense clay material was encountered in several borings below the sandy materials.

After screening with the PID, two soil samples exhibiting the highest PID readings from each boring were selected for laboratory analysis. If obvious evidence of impact was not detected, one sample from the fill material and one sample from the native soil were selected. Selected samples were transferred from bags to clean laboratory-grade glassware, and shipped under chain-of-custody protocol to an independent laboratory for analysis. All samples were analyzed for total petroleum hydrocarbons gasoline- and diesel-range organics (TPH GRO and TPH DRO), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and RCRA-8 Metals.

Groundwater samples were collected from borings B-3, B-5, B-6, and B-9 as well as an existing permanent monitoring well discovered between 1435 and 14396 N Quincy Street (referred to as MW-A). Groundwater was collected from the four borings by placing ten feet of screened PVC to the base of the borehole with riser pipe extending to the surface. Two of the groundwater samples were collected using an inertial pump, two using a disposable bailer and one using a peristaltic pump. Each groundwater sample was placed into laboratory provided glassware, placed on ice, and submitted for analysis of TPH DRO, TPH GRO, and VOCs.

This sampling plan yielded a total of 20 soil samples for laboratory analysis of TPH GRO, TPH DRO, VOCs, SVOCs, and RCRA-8 Metals, and a total of 5 groundwater samples for laboratory analysis of TPH DRO, TPH GRO, and VOCs.

RESULTS

A total of 10 borings were advanced across the property. Obvious evidence of impact (i.e. PID readings, odors, staining, etc.) was detected in B-6 and B-7. The PID readings are included in the boring logs in Appendix II. Fill material was encountered in each of the

borings at depths ranging from 6 to 12 feet below surface grade. Saturated conditions were encountered in 4 of the 10 borings at depths ranging between 4.5 and 11.5 feet below surface grade. The laboratory results are summarized in the tables provided in Appendix III. The final laboratory reports are included in Appendix IV.

Petroleum

TPH DRO was identified in 14 of 20 samples, at concentrations ranging from 9.5 milligrams per kilogram (mg/kg) to 10,300 mg/kg. The highest concentrations of TPH DRO were identified in B-5, B-6, and B-7 (10,300 mg/kg, 2,320 mg/kg, and 1,990 mg/kg respectively), in the fill material sampled at a depth of 3-4 feet below surface grade. The concentrations of TPH-DRO decreased significantly with increasing depth.

TPH GRO was identified in 3 of the 20 samples tested, at concentrations ranging from 0.21 mg/kg to 450 mg/kg. The highest concentration of TPH GRO (450 mg/kg) was found in B-6 in the sample analyzed from the fill material at a depth of 3-4 feet below surface grade.

Volatile Organic Compounds

A full list of the detected compounds and concentrations is included as Table 1 in Appendix III. For comparison purposes, we have included the VDEQ VRP Tier II Risk Based Concentration (RBC) for unrestricted use, the most conservative screening level.

Several VOCs were detected in shallow subsurface soils across the property including acetone, naphthalene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzne, n-butylbenzene, sec-butylebenzene, and 2-butanone (MEK). Table 1 in Appendix III lists all detected VOCs and their respective concentrations. One of the detected VOCs, Napthalene, was found at concentrations exceeding the Virginia Department of Environmental Quality (VDEQ) VRP Tier II RBC. Napthalene was detected at concentrations exceeding the Tier II RBC of 114 micrograms per kilogram (ug/kg) in the sample analyzed from 3-4 feet below surface grade in borings B-5 (10,200 ug/kg), B-6 (24,200 ug/kg), and B-7 (325 ug/kg.

Semi-Volatile Organic Compounds (SVOCs)

A full list of the detected compounds and concentrations is included as Table 3 in Appendix III. For comparison purposes, we have included the VDEQ VRP Tier II Risk Based Concentration (RBC) for unrestricted use.

Based on our review of the detected SVOCs, the following SVOCs were detected at concentrations exceeding the residential RSL in one or more samples: benzo (a) anthracene, benzo (a) pyrene, benzo (b) fluoranthene, benzo (k) fluoranthene, benzo (ghi) perylene, chrysene, dibenzo (a,h) anthracene, dibenzofuran, fluoranthene, fluorine, indeno (1,2,3-cd) pyrene, 2-methylnapthalene, naphthalene, phenanthrene, and pyrene. The borings with the highest concentrations of SVOCs were located in the samples analyzed from the fill material in borings B-5 and B-6.

RCRA 8 Metals

A full list of the detected compounds and concentrations is included as Table 2 in Appendix III. For comparison purposes, we have included the VDEQ VRP Tier II Regional Screening Level for Residential Unrestricted use, the most conservative screening level.

Two RCRA Metals, arsenic and total chromium, were detected at concentrations exceeding their respective screening levels. Arsenic was detected in each of the soil samples analyzed at concentrations ranging from 0.527 mg/kg to 9.28 mg/kg. Seven of the 20 detected arsenic concentrations exceeded the Tier II RBC of 3.4 mg/kg. Total chromium was detected above its Tier II RBC of 3.0 mg/kg in each of the 20 soil samples at concentrations ranging from 11.1 m/kg and 24.6 mg/kg. Although detected concentrations were above their respective RBC, each of the detected concentrations of arsenic and total chromium are within typical background levels for this geologic area.

TPH and VOCs in Groundwater

A full list of the detected compounds and concentrations for groundwater samples is included as Table 4 in Appendix III. We have included the VDEQ reporting limit for TPH in groundwater (1.0 mg/L) and the VDEQ VRP Tier II Regional Screening Level for Residential Unrestricted use.

No free-phase petroleum was detected in the groundwater samples collected during this exploration. Dissolved TPH DRO was detected in 3 of 5 groundwater samples at concentrations ranging between 0.22 milligrams per liter (mg/L) and 3.96 mg/L. The groundwater sample from B-6 (3.96 mg/L) contained a concentration of TPH DRO above the 1.0 mg/L VDEQ reporting limit. The other two samples with detectable TPH DRO (B-5 and MW-A) were below the reporting limit. TPH GRO was not detected in any of the groundwater samples.

VOCs were not detected in the groundwater samples with the exception of acetone and napthalene which were detected in the groundwater sample collected from B-6. The concentration of acetone, 15.6 micrograms per liter (ug/L), was significantly below the Tier II RBC of 1,400 ug/L. The concentration of naphthalene (77.2 ug/L) exceeded the Tier II RBC of 0.61 ug/L.

CONCLUSIONS

In order to determine if previous activities on the property had adversely impacted subsurface soil and/or groundwater, ECS advanced 10 borings on the property to depths ranging between 9 and 19.5 feet below surface at which point saturated conditions or auger refusal was encountered. Based on field screening results, 20 soil samples were analyzed for TPH DRO, TPH GRO, VOCs, SVOCs and RCRA-8 metals. Additionally, five groundwater samples (four temporary wells and one permanent well) were collected and analyzed for TPH DRO, TPH GRO and VOCs.

During advancement of the borings, fill material was detected at depths ranging from 6 to 12 feet below surface grade. Elevated concentrations of TPH DRO and SVOCs were detected in samples analyzed from the fill material with concentrations decreasing with increasing depth. The highest concentrations of TPH DRO and SVOCs were detected in the soil samples analyzed from the fill material in the borings located between the buildings addressed as 1429 and 1435 N Quincy Street (B-5, B-6 and B-7). Based on the shallow depth of the elevated concentrations, it is ECS' opinion that the presence of petroleum contamination is more likely the result of surface spills or previously contaminated material used as fill rather than the result of a release from a UST.

A total of five groundwater samples were collected as part of this investigation. Four of the groundwater samples were collected from temporary wells installed in select soil borings and one was collected from a permanent monitoring well discovered on-site, labeled as MW-A. TPH DRO and naphthalene concentrations in the groundwater sample collected from B-6 exceeded the VDEQ reporting limit for TPH and the Tier II RBC, respectively.

Concentrations of petroleum hydrocarbons detected above method detection limits from samples collected at any time other than a storage tank closure are required to be reported to the VDEQ. Under Virginia Petroleum Storage Tank regulations, it is the responsibility of the site owner/operator to report these results to the VDEQ. The VDEQ may open a pollution complaint case, and may direct additional site investigation or initial abatement measures. ECS recommends that the results of this investigation be provided to the site owner so that appropriate notification of the VDEQ Northern Regional Office, Petroleum Program may be initiated immediately. The phone number for the VDEQ Northern Regional Office is (703) 583-3800.

Based on the current use of the site (i.e. commercial), the fact that the property is covered by hardscape and/or buildings and that the property and surrounding properties are served by public water, the primary risk pathway for exposure is from volatilization of subsurface contamination to indoor air. TPH DRO and SVOCs do not readily volatilize, and therefore, it is ECS's opinion that the detected concentrations do not pose an unacceptable risk based on the current use of the property. However, in the event the property is redeveloped, steps should be taken to mitigate potential risks (dermal, ingestion and inhalation) to future occupants.

In the event future redevelopment involves the excavation of soil, petroleum-impacted excavated should be disposed of appropriately at a landfill or treatment facility permitted to accept such wastes. Construction workers coming into contact with these soils should use caution, and a comprehensive health and safety plan should be developed and implemented for the property prior to redevelopment. Disposal criteria for petroleum-impacted soil depend on the jurisdiction in which it is to be disposed. In Virginia solid waste management regulations divide petroleum-impacted soils into various classes depending on concentration. Soils containing petroleum concentrations less than 50 mg/kg may be disposed with certain restrictions (see 9VAC20-81-660-D). Soils containing less than 500 mg petroleum may be disposed of in a lined landfill permitted to receive such wastes. Soils

containing petroleum concentrations greater than 500 mg/kg may not be disposed of in Virginia landfills, and must be exported to an appropriate treatment or disposal facility.

If soil is disposed of in Maryland, any soil containing petroleum concentrations greater than 10 mg/kg must be considered contaminated and disposed at a licensed petroleum-impacted soil facility. Soils containing less than 10 mg/kg are considered clean fill.

In the District of Columbia, soils containing petroleum concentrations above the Tier 0 limit, 100 mg/kg, cannot be used as clean fill, and must be disposed of at an appropriate disposal or treatment facility.

With regard to future risk, several of the detected SVOCs are potent carcinogens, mutagens or teratogens. Since they are semi-volatile compounds, the potential for vapor migration to indoor air is minimal; and the primary exposure pathway would be ingestion, inhalation of airborne dust particles, or dermal contact. If the current impacted soils are sequestered or "capped" with hardscape/buildings or at least two feet of clean fill materials, the primary exposure pathways could be considered closed, and risk to future occupants of the site will be minimized. Based on the naphthalene concentration detected in groundwater, additional mitigation measures (i.e. vapor barrier) may be necessary in the event residential use is planned.

The contaminated soils and the site's history will likely make this site a good candidate for the Virginia Voluntary Remediation Program (VRP), which is intended to promote redevelopment of environmentally impacted properties (a.k.a. brownfields). However, eligibility for the VRP is dependent upon resolution of any outstanding enforcement actions prior to enrollment in the program. As noted above, the results of this investigation should be reported to the VDEQ Northern Regional Office immediately, and any ongoing Petroleum Program actions resolved prior to application to the VRP.

Although there are costs associated with participating in the VRP, at the end of the process the Virginia Department of Environmental Quality (VDEQ) would issue a "Certificate of Satisfactory Completion," which provides assurance that the site will not later become subject to a VDEQ enforcement action unless additional issues are discovered. This certificate can provide future borrowers and their lenders with a higher comfort level with regard to the site's historical industrial usage and contamination. In addition, there may be tax incentives available for the cleanup and restoration of environmentally impacted sites. ECS recommends discussing these options with your attorney and/or tax accountants. Additional information regarding the VRP can be found here:

http://www.deq.virginia.gov/Programs/LandProtectionRevitalization/RemediationProgram/VoluntaryRemediationProgram.aspx

ECS has appreciated the opportunity to assist you with this project. If you decide that participation in the VRP would be beneficial for your project, ECS can help guide you through the process and provide additional investigation and risk assessment that may be

required by the VDEQ. In addition, ECS can aid during development of the site by preparing a site-specific health and safety plan, conducting air monitoring during and after construction, and providing monitoring for the removal of contaminated soils, if necessary.

If you have any questions about this report or other aspects of this project, please contact us at (703) 471-8400.

Respectfully submitted,

ECS Mid-Atlantic, LLC

Elizabeth M. Boone
Environmental Project Manager

David J. Bookbinder, C.P.G.
Principal Environmental Geologist

James D. Succop, C.P.G.
Director of Environmental Services

Appendix I: Boring Location Diagram
Appendix II: Boring Logs
Appendix III: Summary of Analytical Results
Appendix IV: Analytical Results Tables

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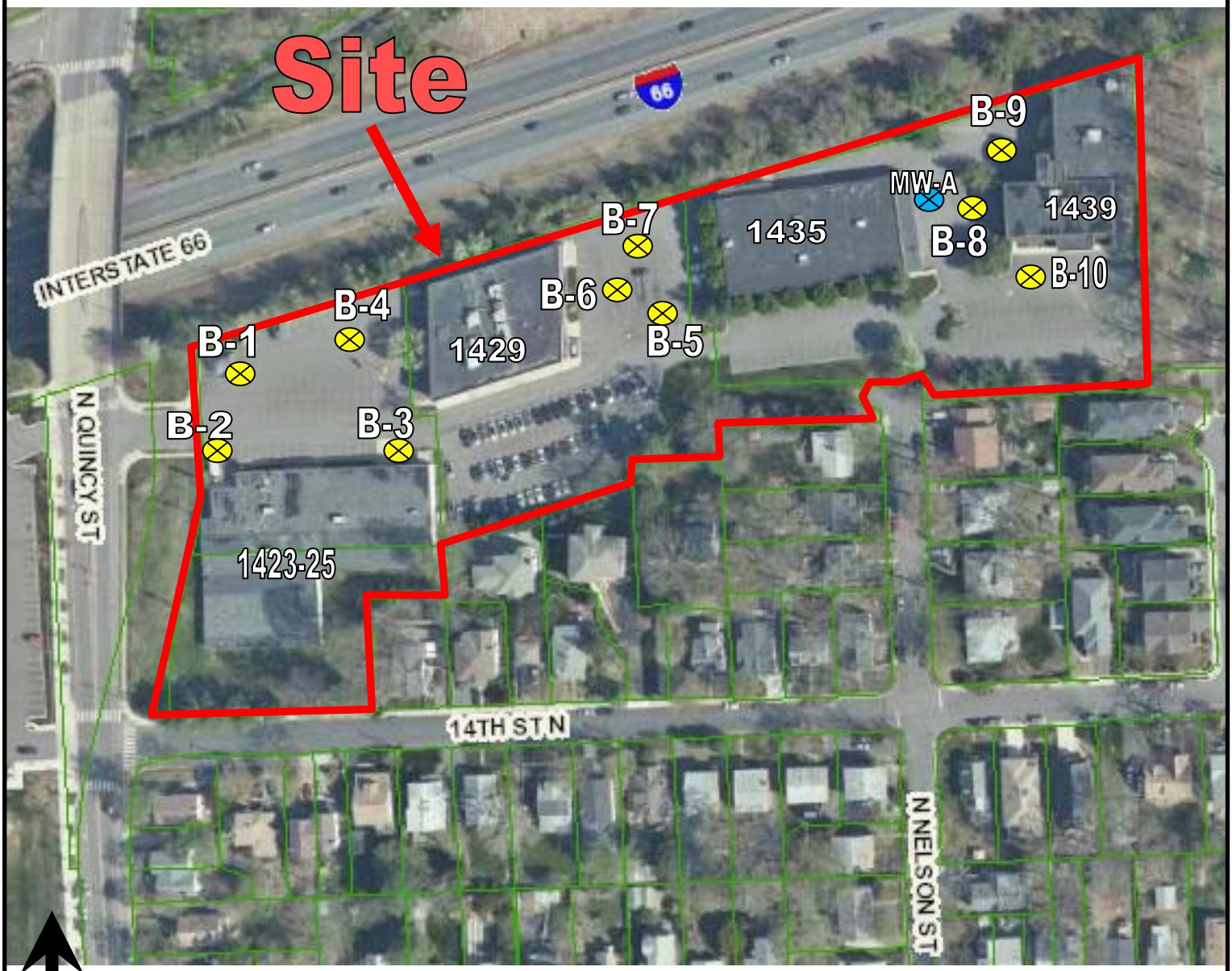
APPENDIX I

BORING LOCATION DIAGRAM



Phase II Environmental Site Assessment **N Quincy Street Office Park** **1425-39 N Quincy Street** **Arlington, VA 22201**	ECS Mid-Atlantic, LLC 14026 Thunderbolt Pl., Suite 100 Chantilly, VA 20151 ECS LLC MID-ATLANTIC	**Boring Location Diagram** **ECS Project No. 23933-A** **Not to scale**

APPENDIX II

BORING LOGS

PROJECT: North Quincy St. Phase II
CLIENT: Arlington County

BORING NUM. B-2
PROJECT NO. 23933-A

LOCATION: North Quincy Street Arlington, Virginia	ELEVATION:	
DRILLER: GSI Inc.	DATE DRILLED: 4/25/15	LOGGED BY: KMC
DRILL RIG: 6620 DT	DEPTH TO WATER: NA	

Elevation/ Depth (Ft)	PID Reading	Sample Number	Sample Recovery (in/in)	Graphic Log	Soil Classification	SOIL DESCRIPTION
0			36 / 48		**Topsoil**	Grass/topsoil 0-3"
	2.7	**1-2'**			**CL Fill**	CLAY (CL), fill, with sand and gravel, brown/black, dry, stiff
4	0.6		18 / 48			
	0.4	**5-6'**			**SC Fill**	Clayey SAND (SC), fill, black/brown, moist, soft
8	0.5		36 / 48			
	0.3				**CL**	CLAY (CL), with sand and gravel, brown/grey, slightly moist, stiff
12	0.2		21 / 48		**SM**	Silty SAND (SM), greenish grey, very stiff, dry, rock fragments
	0.3					Refusal @ 14'
16						
20						
24						
28						

PROJECT: North Quincy St. Phase II
CLIENT: Arlington County

BORING NUM. B-3
PROJECT NO. 23933-A

LOCATION: North Quincy Street Arlington, Virginia	ELEVATION:	
DRILLER: GSI Inc.	DATE DRILLED: 4/25/15	LOGGED BY: KMC
DRILL RIG: 6620 DT	DEPTH TO WATER: 9.50'	

Elevation/ Depth (Ft)	PID Reading	Sample Number	Sample Recovery (in/in)	Graphic Log	Soil Classification	SOIL DESCRIPTION
0			28 / 48		**Asphalt**	Asphalt 0-3"
	0.4					CLAY (CL), fill, with sand and gravel, brown/black, dry, med. stiff
4	0.9		36 / 48		**CL Fill**	
	0.8	**3-4'**				
8	0.8		36 / 48		**SM**	Silty SAND (SM), grey, moist, med. stiff
	0.8	**9-10'**				
12	0.6		36 / 48		**SP**	SAND (SP), poorly graded, orange/brown, moist, loose
	0.3					
					SM	Silty SAND (SM) brown/grey slightly moist, med. stiff.
16	0.6					Refusal @ 16'
20						
24						
28						

This information pertains only to this boring and should not be interpreted as being indicative of the site.

APPENDIX III

SUMMARY OF ANALYTICAL RESULTS

Maryland spectral Services

Analytical Chemistry Services

1500 Caton Center Dr Suite G
Baltimore MD 21227
410-247-7600
www.mdspectral.com
VELAP ID 460040

03 April 2015

David Bookbinder
ECS - Chantilly
14026 Thunderbolt Place, Suite 100
Chantilly, VA 20151

RE: N QUINCY ST. PHASE II

Enclosed are the results of analyses for samples received by the laboratory on 03/27/15 12:45.

Maryland Spectral Services, Inc. is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory. Certification status for analytes included in this report will be provided upon request.

Please visit our website at www.mdspectral.com for a complete listing of our NELAP accreditations.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Will Brewington
Staff Chemist

Analytical Results

1500 Caton Center Dr Suite G
Baltimore MD 21227
410-247-7600
www.mdspectral.com

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

Client Sample ID	Alternate Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B-1 1.5-2'		5032712-01	Soil	03/25/15 09:45	03/27/15 12:45
B-1 8-9'		5032712-02	Soil	03/25/15 09:55	03/27/15 12:45
B-2 1-2'		5032712-03	Soil	03/25/15 10:20	03/27/15 12:45
B-2 5-6'		5032712-04	Soil	03/25/15 10:25	03/27/15 12:45
B-3 3-4'		5032712-05	Soil	03/25/15 10:55	03/27/15 12:45
B-3 9-10'		5032712-06	Soil	03/25/15 11:00	03/27/15 12:45
B-4 1-2'		5032712-07	Soil	03/25/15 11:15	03/27/15 12:45
B-4 9-10'		5032712-08	Soil	03/25/15 11:20	03/27/15 12:45
B-5 3-4'		5032712-09	Soil	03/25/15 12:15	03/27/15 12:45
B-5 11-12'		5032712-10	Soil	03/25/15 12:20	03/27/15 12:45
B-6 3-4'		5032712-11	Soil	03/25/15 13:10	03/27/15 12:45
B-6 7-8'		5032712-12	Soil	03/25/15 13:15	03/27/15 12:45
B-7 3-4'		5032712-13	Soil	03/26/15 08:30	03/27/15 12:45
B-7 5-6'		5032712-14	Soil	03/26/15 08:35	03/27/15 12:45
B-7 6-7'		5032712-15	Soil	03/26/15 08:40	03/27/15 12:45
B-8 1-2'		5032712-16	Soil	03/26/15 09:15	03/27/15 12:45
B-8 11-12.5'		5032712-17	Soil	03/26/15 09:20	03/27/15 12:45
B-9 5-6'		5032712-18	Soil	03/26/15 10:15	03/27/15 12:45
B-9 11-12'		5032712-19	Soil	03/26/15 10:20	03/27/15 12:45
B-10 3-4'		5032712-20	Soil	03/26/15 11:00	03/27/15 12:45
B-3		5032712-21	Water	03/25/15 12:00	03/27/15 12:45
B-5		5032712-22	Water	03/25/15 12:00	03/27/15 12:45
B-6		5032712-23	Water	03/26/15 12:00	03/27/15 12:45
B-9		5032712-24	Water	03/26/15 12:00	03/27/15 12:45
MW-A		5032712-25	Water	03/26/15 12:00	03/27/15 12:45

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Will Brewington, Staff Chemist

Analytical Results

1500 Caton Center Dr Suite G
Baltimore MD 21227
410-247-7600
www.mdspectral.com

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 1-2'

5032712-03 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS)									
Acetone	ND		ug/kg dry	11.8	11.8	1	03/27/15	03/27/15 20:33	WB
tert-Amyl alcohol (TAA)	ND		ug/kg dry	58.8	58.8	1	03/27/15	03/27/15 20:33	WB
tert-Amyl methyl ether (TAME)	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Benzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Bromobenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Bromochloromethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Bromodichloromethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Bromoform	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Bromomethane	ND		ug/kg dry	5.9	5.9	1	03/27/15	03/27/15 20:33	WB
tert-Butanol (TBA)	ND		ug/kg dry	58.8	58.8	1	03/27/15	03/27/15 20:33	WB
2-Butanone (MEK)	ND		ug/kg dry	11.8	11.8	1	03/27/15	03/27/15 20:33	WB
n-Butylbenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
sec-Butylbenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
tert-Butylbenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Carbon disulfide	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Carbon tetrachloride	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Chlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Chloroethane	ND		ug/kg dry	5.9	5.9	1	03/27/15	03/27/15 20:33	WB
Chloroform	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Chloromethane	ND		ug/kg dry	5.9	5.9	1	03/27/15	03/27/15 20:33	WB
2-Chlorotoluene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
4-Chlorotoluene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,2-Dibromo-3-chloropropane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Dibromochloromethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,2-Dibromoethane (EDB)	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Dibromomethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,2-Dichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,3-Dichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,4-Dichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Dichlorodifluoromethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,1-Dichloroethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,2-Dichloroethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,1-Dichloroethene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB

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Will Brewington, Staff Chemist

Analytical Results

1500 Caton Center Dr Suite G
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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 1-2'

5032712-03 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									
cis-1,2-Dichloroethene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
trans-1,2-Dichloroethene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Dichlorofluoromethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,2-Dichloropropane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,3-Dichloropropane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
2,2-Dichloropropane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,1-Dichloropropene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
cis-1,3-Dichloropropene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
trans-1,3-Dichloropropene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Diisopropyl ether (DIPE)	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Ethyl tert-butyl ether (ETBE)	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Ethylbenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Hexachlorobutadiene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
2-Hexanone	ND		ug/kg dry	11.8	11.8	1	03/27/15	03/27/15 20:33	WB
Isopropylbenzene (Cumene)	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
4-Isopropyltoluene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Methyl tert-butyl ether (MTBE)	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
4-Methyl-2-pentanone	ND		ug/kg dry	11.8	11.8	1	03/27/15	03/27/15 20:33	WB
Methylene chloride	ND		ug/kg dry	11.8	11.8	1	03/27/15	03/27/15 20:33	WB
Naphthalene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
n-Propylbenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Styrene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,1,1,2-Tetrachloroethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,1,2,2-Tetrachloroethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Tetrachloroethene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Toluene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,2,3-Trichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,2,4-Trichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,1,1-Trichloroethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,1,2-Trichloroethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Trichloroethene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Trichlorofluoromethane (Freon 11)	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,2,3-Trichloropropane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 1-2'

5032712-03 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									
1,2,4-Trimethylbenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,3,5-Trimethylbenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Vinyl chloride	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
o-Xylene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
m- & p-Xylenes	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Surrogate: 1,2-Dichloroethane-d4			*80-120*	*101 %*		*03/27/15*		*03/27/15 20:33*	
Surrogate: Toluene-d8			*81-117*	*104 %*		*03/27/15*		*03/27/15 20:33*	
Surrogate: 4-Bromofluorobenzene			*74-121*	*89 %*		*03/27/15*		*03/27/15 20:33*	
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS)									
Acenaphthene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Acenaphthylene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Anthracene	**910**	J	ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Benzo[a]anthracene	**2510**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Benzo[b]fluoranthene	**3260**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Benzo[k]fluoranthene	**1230**	J	ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Benzo[ghi]perylene	**1190**	J	ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Benzo[a]pyrene	**2060**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
4-Bromophenyl phenyl ether	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Butyl benzyl phthalate	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Carbazole	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
4-Chloro-3-methylphenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
4-Chloroaniline	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Bis(2-chloroethoxy)methane	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Bis(2-chloroethyl) ether	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Bis(2-chloroisopropyl) ether	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2-Chloronaphthalene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2-Chlorophenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
4-Chlorophenyl phenyl ether	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Chrysene	**2540**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Di-n-butyl phthalate	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Di-n-octyl phthalate	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Dibenzo[a,h]anthracene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Dibenzofuran	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
1,2-Dichlorobenzene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 1-2'

5032712-03 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS) (continued)									
1,3-Dichlorobenzene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
1,4-Dichlorobenzene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
3,3-Dichlorobenzidine	ND		ug/kg dry	2940	2940	5	03/27/15	03/31/15 16:15	WB
2,4-Dichlorophenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Diethyl phthalate	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Dimethyl phthalate	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2,4-Dimethylphenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2-Methyl-4,6-dinitrophenol	ND		ug/kg dry	7350	7350	5	03/27/15	03/31/15 16:15	WB
2,4-Dinitrophenol	ND		ug/kg dry	7350	7350	5	03/27/15	03/31/15 16:15	WB
2,4-Dinitrotoluene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2,6-Dinitrotoluene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Bis(2-ethylhexyl) phthalate	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Fluoranthene	**5440**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Fluorene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Hexachlorobenzene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Hexachlorobutadiene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Hexachlorocyclopentadiene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Hexachloroethane	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Indeno[1,2,3-cd]pyrene	**1040**	J	ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Isophorone	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2-Methylnaphthalene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
3&4-Methylphenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2-Methylphenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
N-Nitroso-di-n-propylamine	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
N-Nitrosodiphenylamine	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Naphthalene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2-Nitroaniline	ND		ug/kg dry	7350	7350	5	03/27/15	03/31/15 16:15	WB
3-Nitroaniline	ND		ug/kg dry	7350	7350	5	03/27/15	03/31/15 16:15	WB
4-Nitroaniline	ND		ug/kg dry	7350	7350	5	03/27/15	03/31/15 16:15	WB
Nitrobenzene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2-Nitrophenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
4-Nitrophenol	ND		ug/kg dry	7350	7350	5	03/27/15	03/31/15 16:15	WB
Pentachlorophenol	ND		ug/kg dry	7350	7350	5	03/27/15	03/31/15 16:15	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 1-2'

5032712-03 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS) (continued)									
Phenanthrene	**3710**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Phenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Pyrene	**5350**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
1,2,4-Trichlorobenzene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2,4,5-Trichlorophenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2,4,6-Trichlorophenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Surrogate: 2-Fluorophenol			*23-121*	*88 %*	*03/27/15*		*03/31/15 16:15*		
Surrogate: Phenol-d5			*24-113*	*87 %*	*03/27/15*		*03/31/15 16:15*		
Surrogate: Nitrobenzene-d5			*23-120*	*94 %*	*03/27/15*		*03/31/15 16:15*		
Surrogate: 2,4,6-Tribromophenol			*19-122*	*70 %*	*03/27/15*		*03/31/15 16:15*		
Surrogate: 2-Fluorobiphenyl			*30-115*	*94 %*	*03/27/15*		*03/31/15 16:15*		
Surrogate: Terphenyl-d14			*18-137*	*129 %*	*03/27/15*		*03/31/15 16:15*		
GASOLINE RANGE ORGANICS BY EPA 5030/8015B									
Gasoline-Range Organics	ND		mg/kg dry	0.12	0.12	1	03/30/15	03/30/15 20:12	ECM
Surrogate: a,a,a-Trifluorotoluene			*85-115*	*100 %*	*03/30/15*		*03/30/15 20:12*		
DIESEL RANGE ORGANICS BY EPA 3540/8015B									
Diesel-Range Organics	**239**		mg/kg dry	18.8	18.8	2	03/28/15	03/29/15 18:16	CMK
Surrogate: o-Terphenyl			*70-130*	*98 %*	*03/28/15*		*03/29/15 18:16*		
PERCENT SOLIDS									
Percent Solids	**85**		%			1	03/27/15	03/28/15 14:04	WB
Metals									
Silver	ND		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK
Arsenic	**3.99**		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK
Barium	**29.9**		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK
Cadmium	ND		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK
Chromium	**18.8**		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK
Mercury	ND		mg/kg dry	0.0906	0.0906	2	04/01/15	04/02/15 13:51	CHK
Lead	**13.3**		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK
Selenium	**0.573**		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK

Will Brewington, Staff Chemist

Analytical Results

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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 1-2'

5032712-03 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
Wet Chemistry									
% Solids	**84.9**		%	1.00	1.00	1	04/01/15	04/01/15 10:39	CMA

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 5-6'

5032712-04 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS)									**S-06**
Acenaphthene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Acenaphthylene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Anthracene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Benzo[a]anthracene	**270**	J	ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Benzo[b]fluoranthene	**360**		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Benzo[k]fluoranthene	**140**	J	ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Benzo[ghi]perylene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Benzo[a]pyrene	**240**	J	ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
4-Bromophenyl phenyl ether	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Butyl benzyl phthalate	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Carbazole	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
4-Chloro-3-methylphenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
4-Chloroaniline	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Bis(2-chloroethoxy)methane	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Bis(2-chloroethyl) ether	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Bis(2-chloroisopropyl) ether	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2-Chloronaphthalene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2-Chlorophenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
4-Chlorophenyl phenyl ether	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Chrysene	**310**		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Di-n-butyl phthalate	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Di-n-octyl phthalate	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Dibenzo[a,h]anthracene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Dibenzofuran	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
1,2-Dichlorobenzene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
1,3-Dichlorobenzene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
1,4-Dichlorobenzene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
3,3-Dichlorobenzidine	ND		ug/kg dry	590	590	1	03/27/15	03/30/15 15:55	WB
2,4-Dichlorophenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Diethyl phthalate	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Dimethyl phthalate	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2,4-Dimethylphenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2-Methyl-4,6-dinitrophenol	ND		ug/kg dry	1470	1470	1	03/27/15	03/30/15 15:55	WB
2,4-Dinitrophenol	ND		ug/kg dry	1470	1470	1	03/27/15	03/30/15 15:55	WB

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Analytical Results

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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 5-6'

5032712-04 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS) (continued)									**S-06**
2,4-Dinitrotoluene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2,6-Dinitrotoluene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Bis(2-ethylhexyl) phthalate	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Fluoranthene	**620**		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Fluorene	**140**	J	ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Hexachlorobenzene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Hexachlorobutadiene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Hexachlorocyclopentadiene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Hexachloroethane	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Indeno[1,2,3-cd]pyrene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Isophorone	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2-Methylnaphthalene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
3&4-Methylphenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2-Methylphenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
N-Nitroso-di-n-propylamine	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
N-Nitrosodiphenylamine	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Naphthalene	**180**	J	ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2-Nitroaniline	ND		ug/kg dry	1470	1470	1	03/27/15	03/30/15 15:55	WB
3-Nitroaniline	ND		ug/kg dry	1470	1470	1	03/27/15	03/30/15 15:55	WB
4-Nitroaniline	ND		ug/kg dry	1470	1470	1	03/27/15	03/30/15 15:55	WB
Nitrobenzene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2-Nitrophenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
4-Nitrophenol	ND		ug/kg dry	1470	1470	1	03/27/15	03/30/15 15:55	WB
Pentachlorophenol	ND		ug/kg dry	1470	1470	1	03/27/15	03/30/15 15:55	WB
Phenanthrene	**550**		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Phenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Pyrene	**570**		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
1,2,4-Trichlorobenzene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2,4,5-Trichlorophenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2,4,6-Trichlorophenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB

Surrogate: 2-Fluorophenol	*23-121*	*91 %*	*03/27/15*	*03/30/15 15:55*
Surrogate: Phenol-d5	*24-113*	*87 %*	*03/27/15*	*03/30/15 15:55*
Surrogate: Nitrobenzene-d5	*23-120*	*84 %*	*03/27/15*	*03/30/15 15:55*
Surrogate: 2,4,6-Tribromophenol	*19-122*	*103 %*	*03/27/15*	*03/30/15 15:55*

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Analytical Results

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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 5-6'

5032712-04 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS) (continued)									**S-06**
Surrogate: 2-Fluorobiphenyl			*30-115*	*93 %*	*03/27/15*		*03/30/15 15:55*		
Surrogate: Terphenyl-d14			*18-137*	*124 %*	*03/27/15*		*03/30/15 15:55*		
GASOLINE RANGE ORGANICS BY EPA 5030/8015B									
Gasoline-Range Organics	ND		mg/kg dry	0.12	0.12	1	03/30/15	03/30/15 20:49	ECM
Surrogate: a,a,a-Trifluorotoluene			*85-115*	*103 %*	*03/30/15*		*03/30/15 20:49*		
DIESEL RANGE ORGANICS BY EPA 3540/8015B									
Diesel-Range Organics	**64.3**		mg/kg dry	9.4	9.4	1	03/28/15	03/29/15 18:42	CMK
Surrogate: o-Terphenyl			*70-130*	*102 %*	*03/28/15*		*03/29/15 18:42*		
PERCENT SOLIDS									
Percent Solids	**85**		%			1	03/27/15	03/28/15 14:04	WB
Metals									
Silver	ND		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Arsenic	**9.28**		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Barium	**135**		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Cadmium	**0.771**		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Chromium	**13.9**		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Mercury	**0.365**		mg/kg dry	0.0941	0.0941	2	04/01/15	04/02/15 13:55	CHK
Lead	**161**		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Selenium	**1.04**		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Wet Chemistry									
% Solids	**81.7**		%	1.00	1.00	1	04/01/15	04/01/15 10:39	CMA

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 5-6'

5032712-04RE1 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS)									
Acetone	**42.9**		ug/kg dry	11.8	11.8	1	03/30/15	03/30/15 19:07	WB
tert-Amyl alcohol (TAA)	ND		ug/kg dry	58.8	58.8	1	03/30/15	03/30/15 19:07	WB
tert-Amyl methyl ether (TAME)	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Benzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Bromobenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Bromochloromethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Bromodichloromethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Bromoform	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Bromomethane	ND		ug/kg dry	5.9	5.9	1	03/30/15	03/30/15 19:07	WB
tert-Butanol (TBA)	ND		ug/kg dry	58.8	58.8	1	03/30/15	03/30/15 19:07	WB
2-Butanone (MEK)	ND		ug/kg dry	11.8	11.8	1	03/30/15	03/30/15 19:07	WB
n-Butylbenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
sec-Butylbenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
tert-Butylbenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Carbon disulfide	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Carbon tetrachloride	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Chlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Chloroethane	ND		ug/kg dry	5.9	5.9	1	03/30/15	03/30/15 19:07	WB
Chloroform	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Chloromethane	ND		ug/kg dry	5.9	5.9	1	03/30/15	03/30/15 19:07	WB
2-Chlorotoluene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
4-Chlorotoluene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,2-Dibromo-3-chloropropane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Dibromochloromethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,2-Dibromoethane (EDB)	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Dibromomethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,2-Dichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,3-Dichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,4-Dichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Dichlorodifluoromethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,1-Dichloroethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,2-Dichloroethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,1-Dichloroethene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 5-6'

5032712-04RE1 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									
cis-1,2-Dichloroethene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
trans-1,2-Dichloroethene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Dichlorofluoromethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,2-Dichloropropane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,3-Dichloropropane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
2,2-Dichloropropane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,1-Dichloropropene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
cis-1,3-Dichloropropene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
trans-1,3-Dichloropropene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Diisopropyl ether (DIPE)	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Ethyl tert-butyl ether (ETBE)	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Ethylbenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Hexachlorobutadiene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
2-Hexanone	ND		ug/kg dry	11.8	11.8	1	03/30/15	03/30/15 19:07	WB
Isopropylbenzene (Cumene)	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
4-Isopropyltoluene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Methyl tert-butyl ether (MTBE)	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
4-Methyl-2-pentanone	ND		ug/kg dry	11.8	11.8	1	03/30/15	03/30/15 19:07	WB
Methylene chloride	ND		ug/kg dry	11.8	11.8	1	03/30/15	03/30/15 19:07	WB
Naphthalene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
n-Propylbenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Styrene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,1,1,2-Tetrachloroethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,1,2,2-Tetrachloroethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Tetrachloroethene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Toluene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,2,3-Trichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,2,4-Trichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,1,1-Trichloroethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,1,2-Trichloroethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Trichloroethene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Trichlorofluoromethane (Freon 11)	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,2,3-Trichloropropane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB

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Analytical Results

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Baltimore MD 21227
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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 5-6'

5032712-04RE1 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									
1,2,4-Trimethylbenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,3,5-Trimethylbenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Vinyl chloride	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
o-Xylene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
m- & p-Xylenes	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Surrogate: 1,2-Dichloroethane-d4			*80-120*	*97 %*			*03/30/15*	*03/30/15 19:07*	
Surrogate: Toluene-d8			*81-117*	*102 %*			*03/30/15*	*03/30/15 19:07*	
Surrogate: 4-Bromofluorobenzene			*74-121*	*89 %*			*03/30/15*	*03/30/15 19:07*	

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 3-4'

5032712-05 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS)									
Acetone	**38.6**		ug/kg dry	11.9	11.9	1	03/27/15	03/27/15 21:33	WB
tert-Amyl alcohol (TAA)	ND		ug/kg dry	59.5	59.5	1	03/27/15	03/27/15 21:33	WB
tert-Amyl methyl ether (TAME)	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Benzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Bromobenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Bromochloromethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Bromodichloromethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Bromoform	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Bromomethane	ND		ug/kg dry	6.0	6.0	1	03/27/15	03/27/15 21:33	WB
tert-Butanol (TBA)	ND		ug/kg dry	59.5	59.5	1	03/27/15	03/27/15 21:33	WB
2-Butanone (MEK)	ND		ug/kg dry	11.9	11.9	1	03/27/15	03/27/15 21:33	WB
n-Butylbenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
sec-Butylbenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
tert-Butylbenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Carbon disulfide	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Carbon tetrachloride	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Chlorobenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Chloroethane	ND		ug/kg dry	6.0	6.0	1	03/27/15	03/27/15 21:33	WB
Chloroform	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Chloromethane	ND		ug/kg dry	6.0	6.0	1	03/27/15	03/27/15 21:33	WB
2-Chlorotoluene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
4-Chlorotoluene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,2-Dibromo-3-chloropropane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Dibromochloromethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,2-Dibromoethane (EDB)	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Dibromomethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,2-Dichlorobenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,3-Dichlorobenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,4-Dichlorobenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Dichlorodifluoromethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,1-Dichloroethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,2-Dichloroethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,1-Dichloroethene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 3-4'

5032712-05 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									
cis-1,2-Dichloroethene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
trans-1,2-Dichloroethene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Dichlorofluoromethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,2-Dichloropropane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,3-Dichloropropane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
2,2-Dichloropropane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,1-Dichloropropene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
cis-1,3-Dichloropropene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
trans-1,3-Dichloropropene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Diisopropyl ether (DIPE)	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Ethyl tert-butyl ether (ETBE)	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Ethylbenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Hexachlorobutadiene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
2-Hexanone	ND		ug/kg dry	11.9	11.9	1	03/27/15	03/27/15 21:33	WB
Isopropylbenzene (Cumene)	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
4-Isopropyltoluene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Methyl tert-butyl ether (MTBE)	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
4-Methyl-2-pentanone	ND		ug/kg dry	11.9	11.9	1	03/27/15	03/27/15 21:33	WB
Methylene chloride	ND		ug/kg dry	11.9	11.9	1	03/27/15	03/27/15 21:33	WB
Naphthalene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
n-Propylbenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Styrene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,1,1,2-Tetrachloroethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,1,2,2-Tetrachloroethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Tetrachloroethene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Toluene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,2,3-Trichlorobenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,2,4-Trichlorobenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,1,1-Trichloroethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,1,2-Trichloroethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Trichloroethene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Trichlorofluoromethane (Freon 11)	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,2,3-Trichloropropane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 3-4'

5032712-05 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									
1,2,4-Trimethylbenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,3,5-Trimethylbenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Vinyl chloride	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
o-Xylene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
m- & p-Xylenes	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Surrogate: 1,2-Dichloroethane-d4			*80-120*	*99 %*		*03/27/15*		*03/27/15 21:33*	
Surrogate: Toluene-d8			*81-117*	*100 %*		*03/27/15*		*03/27/15 21:33*	
Surrogate: 4-Bromofluorobenzene			*74-121*	*92 %*		*03/27/15*		*03/27/15 21:33*	
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS)									
Acenaphthene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Acenaphthylene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Anthracene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Benzo[a]anthracene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Benzo[b]fluoranthene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Benzo[k]fluoranthene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Benzo[ghi]perylene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Benzo[a]pyrene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
4-Bromophenyl phenyl ether	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Butyl benzyl phthalate	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Carbazole	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
4-Chloro-3-methylphenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
4-Chloroaniline	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Bis(2-chloroethoxy)methane	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Bis(2-chloroethyl) ether	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Bis(2-chloroisopropyl) ether	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2-Chloronaphthalene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2-Chlorophenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
4-Chlorophenyl phenyl ether	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Chrysene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Di-n-butyl phthalate	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Di-n-octyl phthalate	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Dibenzo[a,h]anthracene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Dibenzofuran	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 3-4'

5032712-05 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS) (continued)									
1,2-Dichlorobenzene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
1,3-Dichlorobenzene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
1,4-Dichlorobenzene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
3,3-Dichlorobenzidine	ND		ug/kg dry	600	600	1	03/27/15	03/30/15 16:39	WB
2,4-Dichlorophenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Diethyl phthalate	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Dimethyl phthalate	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2,4-Dimethylphenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2-Methyl-4,6-dinitrophenol	ND		ug/kg dry	1490	1490	1	03/27/15	03/30/15 16:39	WB
2,4-Dinitrophenol	ND		ug/kg dry	1490	1490	1	03/27/15	03/30/15 16:39	WB
2,4-Dinitrotoluene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2,6-Dinitrotoluene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Bis(2-ethylhexyl) phthalate	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Fluoranthene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Fluorene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Hexachlorobenzene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Hexachlorobutadiene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Hexachlorocyclopentadiene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Hexachloroethane	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Indeno[1,2,3-cd]pyrene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Isophorone	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2-Methylnaphthalene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
3&4-Methylphenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2-Methylphenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
N-Nitroso-di-n-propylamine	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
N-Nitrosodiphenylamine	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Naphthalene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2-Nitroaniline	ND		ug/kg dry	1490	1490	1	03/27/15	03/30/15 16:39	WB
3-Nitroaniline	ND		ug/kg dry	1490	1490	1	03/27/15	03/30/15 16:39	WB
4-Nitroaniline	ND		ug/kg dry	1490	1490	1	03/27/15	03/30/15 16:39	WB
Nitrobenzene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2-Nitrophenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
4-Nitrophenol	ND		ug/kg dry	1490	1490	1	03/27/15	03/30/15 16:39	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 3-4'

5032712-05 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS) (continued)									
Pentachlorophenol	ND		ug/kg dry	1490	1490	1	03/27/15	03/30/15 16:39	WB
Phenanthrene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Phenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Pyrene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
1,2,4-Trichlorobenzene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2,4,5-Trichlorophenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2,4,6-Trichlorophenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Surrogate: 2-Fluorophenol			*23-121*	*90 %*	*03/27/15*		*03/30/15 16:39*		
Surrogate: Phenol-d5			*24-113*	*86 %*	*03/27/15*		*03/30/15 16:39*		
Surrogate: Nitrobenzene-d5			*23-120*	*85 %*	*03/27/15*		*03/30/15 16:39*		
Surrogate: 2,4,6-Tribromophenol			*19-122*	*103 %*	*03/27/15*		*03/30/15 16:39*		
Surrogate: 2-Fluorobiphenyl			*30-115*	*93 %*	*03/27/15*		*03/30/15 16:39*		
Surrogate: Terphenyl-d14			*18-137*	*104 %*	*03/27/15*		*03/30/15 16:39*		
GASOLINE RANGE ORGANICS BY EPA 5030/8015B									
Gasoline-Range Organics	ND		mg/kg dry	0.12	0.12	1	03/30/15	03/30/15 21:25	ECM
Surrogate: a,a,a-Trifluorotoluene			*85-115*	*101 %*	*03/30/15*		*03/30/15 21:25*		
DIESEL RANGE ORGANICS BY EPA 3540/8015B									
Diesel-Range Organics	ND		mg/kg dry	9.5	9.5	1	03/28/15	03/29/15 19:09	CMK
Surrogate: o-Terphenyl			*70-130*	*83 %*	*03/28/15*		*03/29/15 19:09*		
PERCENT SOLIDS									
Percent Solids	**84**		%			1	03/27/15	03/28/15 14:04	WB

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Analytical Results

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Baltimore MD 21227
410-247-7600
www.mdspectral.com

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 3-4'

5032712-05 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
Metals									
Silver	ND		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Arsenic	**2.06**		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Barium	**21.5**		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Cadmium	ND		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Chromium	**24.6**		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Mercury	ND		mg/kg dry	0.0956	0.0956	2	04/01/15	04/02/15 13:59	CHK
Lead	**6.62**		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Selenium	**0.521**		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Wet Chemistry									
% Solids	**82.1**		%	1.00	1.00	1	04/01/15	04/01/15 10:39	CMA

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Analytical Results

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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 9-10'

5032712-06 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS)									**S-06**
Acetone	**105**		ug/kg dry	12.2	12.2	1	03/29/15	03/29/15 15:59	WB
tert-Amyl alcohol (TAA)	ND		ug/kg dry	61.0	61.0	1	03/29/15	03/29/15 15:59	WB
tert-Amyl methyl ether (TAME)	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Benzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Bromobenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Bromochloromethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Bromodichloromethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Bromoform	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Bromomethane	ND		ug/kg dry	6.1	6.1	1	03/29/15	03/29/15 15:59	WB
tert-Butanol (TBA)	ND		ug/kg dry	61.0	61.0	1	03/29/15	03/29/15 15:59	WB
2-Butanone (MEK)	**18.1**		ug/kg dry	12.2	12.2	1	03/29/15	03/29/15 15:59	WB
n-Butylbenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
sec-Butylbenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
tert-Butylbenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Carbon disulfide	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Carbon tetrachloride	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Chlorobenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Chloroethane	ND		ug/kg dry	6.1	6.1	1	03/29/15	03/29/15 15:59	WB
Chloroform	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Chloromethane	ND		ug/kg dry	6.1	6.1	1	03/29/15	03/29/15 15:59	WB
2-Chlorotoluene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
4-Chlorotoluene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,2-Dibromo-3-chloropropane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Dibromochloromethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,2-Dibromoethane (EDB)	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Dibromomethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,2-Dichlorobenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,3-Dichlorobenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,4-Dichlorobenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Dichlorodifluoromethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,1-Dichloroethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,2-Dichloroethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,1-Dichloroethene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB

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Analytical Results

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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 9-10'

5032712-06 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									**S-06**
cis-1,2-Dichloroethene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
trans-1,2-Dichloroethene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Dichlorofluoromethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,2-Dichloropropane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,3-Dichloropropane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
2,2-Dichloropropane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,1-Dichloropropene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
cis-1,3-Dichloropropene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
trans-1,3-Dichloropropene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Diisopropyl ether (DIPE)	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Ethyl tert-butyl ether (ETBE)	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Ethylbenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Hexachlorobutadiene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
2-Hexanone	ND		ug/kg dry	12.2	12.2	1	03/29/15	03/29/15 15:59	WB
Isopropylbenzene (Cumene)	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
4-Isopropyltoluene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Methyl tert-butyl ether (MTBE)	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
4-Methyl-2-pentanone	ND		ug/kg dry	12.2	12.2	1	03/29/15	03/29/15 15:59	WB
Methylene chloride	ND		ug/kg dry	12.2	12.2	1	03/29/15	03/29/15 15:59	WB
Naphthalene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
n-Propylbenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Styrene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,1,1,2-Tetrachloroethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,1,2,2-Tetrachloroethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Tetrachloroethene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Toluene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,2,3-Trichlorobenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,2,4-Trichlorobenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,1,1-Trichloroethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,1,2-Trichloroethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Trichloroethene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Trichlorofluoromethane (Freon 11)	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,2,3-Trichloropropane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 9-10'

5032712-06 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									**S-06**
1,2,4-Trimethylbenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,3,5-Trimethylbenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Vinyl chloride	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
o-Xylene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
m- & p-Xylenes	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Surrogate: 1,2-Dichloroethane-d4			*80-120*	*102 %*		*03/29/15*		*03/29/15 15:59*	
Surrogate: Toluene-d8			*81-117*	*111 %*		*03/29/15*		*03/29/15 15:59*	
Surrogate: 4-Bromofluorobenzene			*74-121*	*79 %*		*03/29/15*		*03/29/15 15:59*	
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS)									
Acenaphthene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Acenaphthylene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Anthracene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Benzo[a]anthracene	**1380**	J	ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Benzo[b]fluoranthene	**1730**		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Benzo[k]fluoranthene	**630**	J	ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Benzo[ghi]perylene	**650**	J	ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Benzo[a]pyrene	**1150**	J	ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
4-Bromophenyl phenyl ether	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Butyl benzyl phthalate	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Carbazole	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
4-Chloro-3-methylphenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
4-Chloroaniline	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Bis(2-chloroethoxy)methane	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Bis(2-chloroethyl) ether	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Bis(2-chloroisopropyl) ether	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2-Chloronaphthalene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2-Chlorophenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
4-Chlorophenyl phenyl ether	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Chrysene	**1450**	J	ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Di-n-butyl phthalate	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Di-n-octyl phthalate	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Dibenzo[a,h]anthracene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Dibenzofuran	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
1,2-Dichlorobenzene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 9-10'

5032712-06 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS) (continued)									
1,3-Dichlorobenzene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
1,4-Dichlorobenzene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
3,3-Dichlorobenzidine	ND		ug/kg dry	3050	3050	5	03/27/15	03/31/15 16:58	WB
2,4-Dichlorophenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Diethyl phthalate	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Dimethyl phthalate	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2,4-Dimethylphenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2-Methyl-4,6-dinitrophenol	ND		ug/kg dry	7620	7620	5	03/27/15	03/31/15 16:58	WB
2,4-Dinitrophenol	ND		ug/kg dry	7620	7620	5	03/27/15	03/31/15 16:58	WB
2,4-Dinitrotoluene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2,6-Dinitrotoluene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Bis(2-ethylhexyl) phthalate	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Fluoranthene	**2700**		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Fluorene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Hexachlorobenzene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Hexachlorobutadiene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Hexachlorocyclopentadiene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Hexachloroethane	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Indeno[1,2,3-cd]pyrene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Isophorone	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2-Methylnaphthalene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
3&4-Methylphenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2-Methylphenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
N-Nitroso-di-n-propylamine	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
N-Nitrosodiphenylamine	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Naphthalene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2-Nitroaniline	ND		ug/kg dry	7620	7620	5	03/27/15	03/31/15 16:58	WB
3-Nitroaniline	ND		ug/kg dry	7620	7620	5	03/27/15	03/31/15 16:58	WB
4-Nitroaniline	ND		ug/kg dry	7620	7620	5	03/27/15	03/31/15 16:58	WB
Nitrobenzene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2-Nitrophenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
4-Nitrophenol	ND		ug/kg dry	7620	7620	5	03/27/15	03/31/15 16:58	WB
Pentachlorophenol	ND		ug/kg dry	7620	7620	5	03/27/15	03/31/15 16:58	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 9-10'

5032712-06 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS) (continued)									
Phenanthrene	**2130**		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Phenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Pyrene	**3440**		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
1,2,4-Trichlorobenzene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2,4,5-Trichlorophenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2,4,6-Trichlorophenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Surrogate: 2-Fluorophenol			*23-121*	*84 %*	*03/27/15*		*03/31/15 16:58*		
Surrogate: Phenol-d5			*24-113*	*85 %*	*03/27/15*		*03/31/15 16:58*		
Surrogate: Nitrobenzene-d5			*23-120*	*89 %*	*03/27/15*		*03/31/15 16:58*		
Surrogate: 2,4,6-Tribromophenol			*19-122*	*85 %*	*03/27/15*		*03/31/15 16:58*		
Surrogate: 2-Fluorobiphenyl			*30-115*	*90 %*	*03/27/15*		*03/31/15 16:58*		
Surrogate: Terphenyl-d14			*18-137*	*143 %*	*03/27/15*		*03/31/15 16:58*		
GASOLINE RANGE ORGANICS BY EPA 5030/8015B									
Gasoline-Range Organics	ND		mg/kg dry	0.12	0.12	1	03/30/15	03/30/15 22:02	ECM
Surrogate: a,a,a-Trifluorotoluene			*85-115*	*97 %*	*03/30/15*		*03/30/15 22:02*		
DIESEL RANGE ORGANICS BY EPA 3540/8015B									
Diesel-Range Organics	**130**		mg/kg dry	9.8	9.8	1	03/28/15	03/29/15 19:35	CMK
Surrogate: o-Terphenyl			*70-130*	*105 %*	*03/28/15*		*03/29/15 19:35*		
PERCENT SOLIDS									
Percent Solids	**82**		%			1	03/27/15	03/28/15 14:04	WB
Metals									
Silver	ND		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK
Arsenic	**4.10**		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK
Barium	**43.9**		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK
Cadmium	**0.657**		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK
Chromium	**14.7**		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK
Mercury	ND		mg/kg dry	0.0915	0.0915	2	04/01/15	04/02/15 14:03	CHK
Lead	**166**		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK
Selenium	**0.572**		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK

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Will Brewington, Staff Chemist

Analytical Results

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410-247-7600
www.mdspectral.com

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 9-10'

5032712-06 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
Wet Chemistry									
% Solids	**81.0**		%	1.00	1.00	1	04/01/15	04/01/15 10:39	CMA

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Will Brewington, Staff Chemist

Analytical Results

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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

Notes and Definitions

S-06	Surrogate recovery and/or internal standard area are outside control limits due to sample matrix effect as confirmed by reanalysis.
S-02	The surrogate recovery for this sample cannot be accurately quantified due to interference from coeluting organic compounds present in the sample extract.
S-01	The surrogate recovery for this sample is not available due to sample dilution required from high analyte concentration and/or matrix interference.
J	Detected but below the reporting limit; therefore, result is an estimated concentration (CLP J-Flag).
E	The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate (CLP E-flag).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Will Brewington, Staff Chemist

Maryland spectral Services

Analytical Chemistry Services

1500 Caton Center Dr Suite G
Baltimore MD 21227
410-247-7600
www.mdspectral.com
VELAP ID 460040

03 April 2015

David Bookbinder
ECS - Chantilly
14026 Thunderbolt Place, Suite 100
Chantilly, VA 20151

RE: N QUINCY ST. PHASE II

Enclosed are the results of analyses for samples received by the laboratory on 03/27/15 12:45.

Maryland Spectral Services, Inc. is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory. Certification status for analytes included in this report will be provided upon request.

Please visit our website at www.mdspectral.com for a complete listing of our NELAP accreditations.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Will Brewington
Staff Chemist

Analytical Results

1500 Caton Center Dr Suite G
Baltimore MD 21227
410-247-7600
www.mdspectral.com

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

Client Sample ID	Alternate Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B-1 1.5-2'		5032712-01	Soil	03/25/15 09:45	03/27/15 12:45
B-1 8-9'		5032712-02	Soil	03/25/15 09:55	03/27/15 12:45
B-2 1-2'		5032712-03	Soil	03/25/15 10:20	03/27/15 12:45
B-2 5-6'		5032712-04	Soil	03/25/15 10:25	03/27/15 12:45
B-3 3-4'		5032712-05	Soil	03/25/15 10:55	03/27/15 12:45
B-3 9-10'		5032712-06	Soil	03/25/15 11:00	03/27/15 12:45
B-4 1-2'		5032712-07	Soil	03/25/15 11:15	03/27/15 12:45
B-4 9-10'		5032712-08	Soil	03/25/15 11:20	03/27/15 12:45
B-5 3-4'		5032712-09	Soil	03/25/15 12:15	03/27/15 12:45
B-5 11-12'		5032712-10	Soil	03/25/15 12:20	03/27/15 12:45
B-6 3-4'		5032712-11	Soil	03/25/15 13:10	03/27/15 12:45
B-6 7-8'		5032712-12	Soil	03/25/15 13:15	03/27/15 12:45
B-7 3-4'		5032712-13	Soil	03/26/15 08:30	03/27/15 12:45
B-7 5-6'		5032712-14	Soil	03/26/15 08:35	03/27/15 12:45
B-7 6-7'		5032712-15	Soil	03/26/15 08:40	03/27/15 12:45
B-8 1-2'		5032712-16	Soil	03/26/15 09:15	03/27/15 12:45
B-8 11-12.5'		5032712-17	Soil	03/26/15 09:20	03/27/15 12:45
B-9 5-6'		5032712-18	Soil	03/26/15 10:15	03/27/15 12:45
B-9 11-12'		5032712-19	Soil	03/26/15 10:20	03/27/15 12:45
B-10 3-4'		5032712-20	Soil	03/26/15 11:00	03/27/15 12:45
B-3		5032712-21	Water	03/25/15 12:00	03/27/15 12:45
B-5		5032712-22	Water	03/25/15 12:00	03/27/15 12:45
B-6		5032712-23	Water	03/26/15 12:00	03/27/15 12:45
B-9		5032712-24	Water	03/26/15 12:00	03/27/15 12:45
MW-A		5032712-25	Water	03/26/15 12:00	03/27/15 12:45

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Analytical Results

1500 Caton Center Dr Suite G
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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

Summary Of Detections

B-2 1-2'

5032712-03 (Soil)

Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS)									
Anthracene	**910**	J	ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Benzo[a]anthracene	**2510**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Benzo[b]fluoranthene	**3260**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Benzo[k]fluoranthene	**1230**	J	ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Benzo[ghi]perylene	**1190**	J	ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Benzo[a]pyrene	**2060**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Chrysene	**2540**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Fluoranthene	**5440**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Indeno[1,2,3-cd]pyrene	**1040**	J	ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Phenanthrene	**3710**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Pyrene	**5350**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB

Will Brewington, Staff Chemist

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

Summary Of Detections

B-2 1-2'

5032712-03 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
GASOLINE RANGE ORGANICS BY EPA 5030/8015B									
DIESEL RANGE ORGANICS BY EPA 3540/8015B									
Diesel-Range Organics	**239**		mg/kg dry	18.8	18.8	2	03/28/15	03/29/15 18:16	CMK
Metals									
Arsenic	**3.99**		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK
Barium	**29.9**		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK
Chromium	**18.8**		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK
Lead	**13.3**		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK
Selenium	**0.573**		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK
Wet Chemistry									
% Solids	**84.9**		%	1.00	1.00	1	04/01/15	04/01/15 10:39	CMA

B-2 5-6'

5032712-04 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS)									**S-06**
Benzo[a]anthracene	**270**	J	ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Benzo[b]fluoranthene	**360**		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Benzo[k]fluoranthene	**140**	J	ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Benzo[a]pyrene	**240**	J	ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Chrysene	**310**		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Fluoranthene	**620**		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Fluorene	**140**	J	ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Naphthalene	**180**	J	ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Phenanthrene	**550**		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Pyrene	**570**		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

Summary Of Detections

B-2 5-6'

5032712-04 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
GASOLINE RANGE ORGANICS BY EPA 5030/8015B									
DIESEL RANGE ORGANICS BY EPA 3540/8015B									
Diesel-Range Organics	**64.3**		mg/kg dry	9.4	9.4	1	03/28/15	03/29/15 18:42	CMK
Metals									
Arsenic	**9.28**		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Barium	**135**		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Cadmium	**0.771**		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Chromium	**13.9**		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Mercury	**0.365**		mg/kg dry	0.0941	0.0941	2	04/01/15	04/02/15 13:55	CHK
Lead	**161**		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Selenium	**1.04**		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Wet Chemistry									
% Solids	**81.7**		%	1.00	1.00	1	04/01/15	04/01/15 10:39	CMA

B-2 5-6'

5032712-04RE1 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS)									
Acetone	**42.9**		ug/kg dry	11.8	11.8	1	03/30/15	03/30/15 19:07	WB

B-3 3-4'

5032712-05 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS)									
Acetone	**38.6**		ug/kg dry	11.9	11.9	1	03/27/15	03/27/15 21:33	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

Summary Of Detections

B-3 3-4'

5032712-05 (Soil)

Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS)									

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

Summary Of Detections

B-3 3-4'

5032712-05 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
GASOLINE RANGE ORGANICS BY EPA 5030/8015B									
DIESEL RANGE ORGANICS BY EPA 3540/8015B									
Metals									
Arsenic	**2.06**		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Barium	**21.5**		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Chromium	**24.6**		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Lead	**6.62**		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Selenium	**0.521**		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Wet Chemistry									
% Solids	**82.1**		%	1.00	1.00	1	04/01/15	04/01/15 10:39	CMA

B-3 9-10'

5032712-06 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS)									**S-06**
Acetone	**105**		ug/kg dry	12.2	12.2	1	03/29/15	03/29/15 15:59	WB
2-Butanone (MEK)	**18.1**		ug/kg dry	12.2	12.2	1	03/29/15	03/29/15 15:59	WB

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Analytical Results

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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

Summary Of Detections

B-3 9-10'

5032712-06 (Soil)

Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS)									
Benzo[a]anthracene	**1380**	J	ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Benzo[b]fluoranthene	**1730**		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Benzo[k]fluoranthene	**630**	J	ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Benzo[ghi]perylene	**650**	J	ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Benzo[a]pyrene	**1150**	J	ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Chrysene	**1450**	J	ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Fluoranthene	**2700**		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Phenanthrene	**2130**		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Pyrene	**3440**		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB

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Will Brewington, Staff Chemist

Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

Summary Of Detections

B-3 9-10'

5032712-06 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
GASOLINE RANGE ORGANICS BY EPA 5030/8015B									
DIESEL RANGE ORGANICS BY EPA 3540/8015B									
Diesel-Range Organics	**130**		mg/kg dry	9.8	9.8	1	03/28/15	03/29/15 19:35	CMK
Metals									
Arsenic	**4.10**		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK
Barium	**43.9**		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK
Cadmium	**0.657**		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK
Chromium	**14.7**		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK
Lead	**166**		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK
Selenium	**0.572**		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK
Wet Chemistry									
% Solids	**81.0**		%	1.00	1.00	1	04/01/15	04/01/15 10:39	CMA

B-4 1-2'

5032712-07 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS)									**S-06**
Fluoranthene	**1300**	J	ug/kg dry	2810	1120	5	03/27/15	03/31/15 18:26	WB
Pyrene	**2020**	J	ug/kg dry	2810	1120	5	03/27/15	03/31/15 18:26	WB

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Will Brewington, Staff Chemist

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

Summary Of Detections

B-3

5032712-21 (Water)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
GASOLINE RANGE ORGANICS BY EPA 8015B									
DIESEL RANGE ORGANICS BY EPA 3510/8015B									

B-5

5032712-22 (Water)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS)									

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Analytical Results

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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 1-2'

5032712-03 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS)									
Acetone	ND		ug/kg dry	11.8	11.8	1	03/27/15	03/27/15 20:33	WB
tert-Amyl alcohol (TAA)	ND		ug/kg dry	58.8	58.8	1	03/27/15	03/27/15 20:33	WB
tert-Amyl methyl ether (TAME)	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Benzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Bromobenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Bromochloromethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Bromodichloromethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Bromoform	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Bromomethane	ND		ug/kg dry	5.9	5.9	1	03/27/15	03/27/15 20:33	WB
tert-Butanol (TBA)	ND		ug/kg dry	58.8	58.8	1	03/27/15	03/27/15 20:33	WB
2-Butanone (MEK)	ND		ug/kg dry	11.8	11.8	1	03/27/15	03/27/15 20:33	WB
n-Butylbenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
sec-Butylbenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
tert-Butylbenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Carbon disulfide	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Carbon tetrachloride	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Chlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Chloroethane	ND		ug/kg dry	5.9	5.9	1	03/27/15	03/27/15 20:33	WB
Chloroform	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Chloromethane	ND		ug/kg dry	5.9	5.9	1	03/27/15	03/27/15 20:33	WB
2-Chlorotoluene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
4-Chlorotoluene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,2-Dibromo-3-chloropropane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Dibromochloromethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,2-Dibromoethane (EDB)	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Dibromomethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,2-Dichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,3-Dichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,4-Dichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Dichlorodifluoromethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,1-Dichloroethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,2-Dichloroethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,1-Dichloroethene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 1-2'

5032712-03 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									
cis-1,2-Dichloroethene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
trans-1,2-Dichloroethene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Dichlorofluoromethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,2-Dichloropropane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,3-Dichloropropane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
2,2-Dichloropropane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,1-Dichloropropene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
cis-1,3-Dichloropropene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
trans-1,3-Dichloropropene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Diisopropyl ether (DIPE)	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Ethyl tert-butyl ether (ETBE)	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Ethylbenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Hexachlorobutadiene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
2-Hexanone	ND		ug/kg dry	11.8	11.8	1	03/27/15	03/27/15 20:33	WB
Isopropylbenzene (Cumene)	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
4-Isopropyltoluene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Methyl tert-butyl ether (MTBE)	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
4-Methyl-2-pentanone	ND		ug/kg dry	11.8	11.8	1	03/27/15	03/27/15 20:33	WB
Methylene chloride	ND		ug/kg dry	11.8	11.8	1	03/27/15	03/27/15 20:33	WB
Naphthalene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
n-Propylbenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Styrene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,1,1,2-Tetrachloroethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,1,2,2-Tetrachloroethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Tetrachloroethene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Toluene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,2,3-Trichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,2,4-Trichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,1,1-Trichloroethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,1,2-Trichloroethane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Trichloroethene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Trichlorofluoromethane (Freon 11)	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,2,3-Trichloropropane	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 1-2'

5032712-03 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									
1,2,4-Trimethylbenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
1,3,5-Trimethylbenzene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Vinyl chloride	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
o-Xylene	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
m- & p-Xylenes	ND		ug/kg dry	5.9	2.4	1	03/27/15	03/27/15 20:33	WB
Surrogate: 1,2-Dichloroethane-d4			*80-120*	*101 %*		*03/27/15*	*03/27/15 20:33*		
Surrogate: Toluene-d8			*81-117*	*104 %*		*03/27/15*	*03/27/15 20:33*		
Surrogate: 4-Bromofluorobenzene			*74-121*	*89 %*		*03/27/15*	*03/27/15 20:33*		
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS)									
Acenaphthene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Acenaphthylene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Anthracene	**910**	J	ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Benzo[a]anthracene	**2510**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Benzo[b]fluoranthene	**3260**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Benzo[k]fluoranthene	**1230**	J	ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Benzo[ghi]perylene	**1190**	J	ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Benzo[a]pyrene	**2060**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
4-Bromophenyl phenyl ether	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Butyl benzyl phthalate	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Carbazole	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
4-Chloro-3-methylphenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
4-Chloroaniline	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Bis(2-chloroethoxy)methane	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Bis(2-chloroethyl) ether	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Bis(2-chloroisopropyl) ether	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2-Chloronaphthalene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2-Chlorophenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
4-Chlorophenyl phenyl ether	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Chrysene	**2540**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Di-n-butyl phthalate	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Di-n-octyl phthalate	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Dibenzo[a,h]anthracene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Dibenzofuran	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
1,2-Dichlorobenzene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 1-2'

5032712-03 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS) (continued)									
1,3-Dichlorobenzene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
1,4-Dichlorobenzene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
3,3-Dichlorobenzidine	ND		ug/kg dry	2940	2940	5	03/27/15	03/31/15 16:15	WB
2,4-Dichlorophenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Diethyl phthalate	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Dimethyl phthalate	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2,4-Dimethylphenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2-Methyl-4,6-dinitrophenol	ND		ug/kg dry	7350	7350	5	03/27/15	03/31/15 16:15	WB
2,4-Dinitrophenol	ND		ug/kg dry	7350	7350	5	03/27/15	03/31/15 16:15	WB
2,4-Dinitrotoluene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2,6-Dinitrotoluene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Bis(2-ethylhexyl) phthalate	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Fluoranthene	**5440**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Fluorene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Hexachlorobenzene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Hexachlorobutadiene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Hexachlorocyclopentadiene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Hexachloroethane	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Indeno[1,2,3-cd]pyrene	**1040**	J	ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Isophorone	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2-Methylnaphthalene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
3&4-Methylphenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2-Methylphenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
N-Nitroso-di-n-propylamine	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
N-Nitrosodiphenylamine	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Naphthalene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2-Nitroaniline	ND		ug/kg dry	7350	7350	5	03/27/15	03/31/15 16:15	WB
3-Nitroaniline	ND		ug/kg dry	7350	7350	5	03/27/15	03/31/15 16:15	WB
4-Nitroaniline	ND		ug/kg dry	7350	7350	5	03/27/15	03/31/15 16:15	WB
Nitrobenzene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2-Nitrophenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
4-Nitrophenol	ND		ug/kg dry	7350	7350	5	03/27/15	03/31/15 16:15	WB
Pentachlorophenol	ND		ug/kg dry	7350	7350	5	03/27/15	03/31/15 16:15	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 1-2'

5032712-03 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS) (continued)									
Phenanthrene	**3710**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Phenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Pyrene	**5350**		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
1,2,4-Trichlorobenzene	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2,4,5-Trichlorophenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
2,4,6-Trichlorophenol	ND		ug/kg dry	1470	590	5	03/27/15	03/31/15 16:15	WB
Surrogate: 2-Fluorophenol			*23-121*	*88 %*	*03/27/15*		*03/31/15 16:15*		
Surrogate: Phenol-d5			*24-113*	*87 %*	*03/27/15*		*03/31/15 16:15*		
Surrogate: Nitrobenzene-d5			*23-120*	*94 %*	*03/27/15*		*03/31/15 16:15*		
Surrogate: 2,4,6-Tribromophenol			*19-122*	*70 %*	*03/27/15*		*03/31/15 16:15*		
Surrogate: 2-Fluorobiphenyl			*30-115*	*94 %*	*03/27/15*		*03/31/15 16:15*		
Surrogate: Terphenyl-d14			*18-137*	*129 %*	*03/27/15*		*03/31/15 16:15*		
GASOLINE RANGE ORGANICS BY EPA 5030/8015B									
Gasoline-Range Organics	ND		mg/kg dry	0.12	0.12	1	03/30/15	03/30/15 20:12	ECM
Surrogate: a,a,a-Trifluorotoluene			*85-115*	*100 %*	*03/30/15*		*03/30/15 20:12*		
DIESEL RANGE ORGANICS BY EPA 3540/8015B									
Diesel-Range Organics	**239**		mg/kg dry	18.8	18.8	2	03/28/15	03/29/15 18:16	CMK
Surrogate: o-Terphenyl			*70-130*	*98 %*	*03/28/15*		*03/29/15 18:16*		
PERCENT SOLIDS									
Percent Solids	**85**		%			1	03/27/15	03/28/15 14:04	WB
Metals									
Silver	ND		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK
Arsenic	**3.99**		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK
Barium	**29.9**		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK
Cadmium	ND		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK
Chromium	**18.8**		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK
Mercury	ND		mg/kg dry	0.0906	0.0906	2	04/01/15	04/02/15 13:51	CHK
Lead	**13.3**		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK
Selenium	**0.573**		mg/kg dry	0.453	0.453	2	04/01/15	04/02/15 13:51	CHK

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Analytical Results

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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 1-2'

5032712-03 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
Wet Chemistry									
% Solids	**84.9**		%	1.00	1.00	1	04/01/15	04/01/15 10:39	CMA

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Analytical Results

Project: N QUINCY ST. PHASE II

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Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 5-6'

5032712-04 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS)									**S-06**
Acenaphthene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Acenaphthylene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Anthracene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Benzo[a]anthracene	**270**	J	ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Benzo[b]fluoranthene	**360**		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Benzo[k]fluoranthene	**140**	J	ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Benzo[ghi]perylene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Benzo[a]pyrene	**240**	J	ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
4-Bromophenyl phenyl ether	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Butyl benzyl phthalate	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Carbazole	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
4-Chloro-3-methylphenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
4-Chloroaniline	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Bis(2-chloroethoxy)methane	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Bis(2-chloroethyl) ether	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Bis(2-chloroisopropyl) ether	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2-Chloronaphthalene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2-Chlorophenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
4-Chlorophenyl phenyl ether	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Chrysene	**310**		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Di-n-butyl phthalate	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Di-n-octyl phthalate	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Dibenzo[a,h]anthracene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Dibenzofuran	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
1,2-Dichlorobenzene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
1,3-Dichlorobenzene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
1,4-Dichlorobenzene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
3,3-Dichlorobenzidine	ND		ug/kg dry	590	590	1	03/27/15	03/30/15 15:55	WB
2,4-Dichlorophenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Diethyl phthalate	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Dimethyl phthalate	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2,4-Dimethylphenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2-Methyl-4,6-dinitrophenol	ND		ug/kg dry	1470	1470	1	03/27/15	03/30/15 15:55	WB
2,4-Dinitrophenol	ND		ug/kg dry	1470	1470	1	03/27/15	03/30/15 15:55	WB

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Will Brewington, Staff Chemist

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 5-6'

5032712-04 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS) (continued)									**S-06**
2,4-Dinitrotoluene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2,6-Dinitrotoluene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Bis(2-ethylhexyl) phthalate	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Fluoranthene	**620**		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Fluorene	**140**	J	ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Hexachlorobenzene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Hexachlorobutadiene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Hexachlorocyclopentadiene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Hexachloroethane	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Indeno[1,2,3-cd]pyrene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Isophorone	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2-Methylnaphthalene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
3&4-Methylphenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2-Methylphenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
N-Nitroso-di-n-propylamine	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
N-Nitrosodiphenylamine	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Naphthalene	**180**	J	ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2-Nitroaniline	ND		ug/kg dry	1470	1470	1	03/27/15	03/30/15 15:55	WB
3-Nitroaniline	ND		ug/kg dry	1470	1470	1	03/27/15	03/30/15 15:55	WB
4-Nitroaniline	ND		ug/kg dry	1470	1470	1	03/27/15	03/30/15 15:55	WB
Nitrobenzene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2-Nitrophenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
4-Nitrophenol	ND		ug/kg dry	1470	1470	1	03/27/15	03/30/15 15:55	WB
Pentachlorophenol	ND		ug/kg dry	1470	1470	1	03/27/15	03/30/15 15:55	WB
Phenanthrene	**550**		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Phenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
Pyrene	**570**		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
1,2,4-Trichlorobenzene	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2,4,5-Trichlorophenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB
2,4,6-Trichlorophenol	ND		ug/kg dry	290	120	1	03/27/15	03/30/15 15:55	WB

Surrogate: 2-Fluorophenol	*23-121*	*91 %*	*03/27/15*	*03/30/15 15:55*
Surrogate: Phenol-d5	*24-113*	*87 %*	*03/27/15*	*03/30/15 15:55*
Surrogate: Nitrobenzene-d5	*23-120*	*84 %*	*03/27/15*	*03/30/15 15:55*
Surrogate: 2,4,6-Tribromophenol	*19-122*	*103 %*	*03/27/15*	*03/30/15 15:55*

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Analytical Results

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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 5-6'

5032712-04 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS) (continued)									**S-06**
Surrogate: 2-Fluorobiphenyl			*30-115*	*93 %*	*03/27/15*		*03/30/15 15:55*		
Surrogate: Terphenyl-d14			*18-137*	*124 %*	*03/27/15*		*03/30/15 15:55*		
GASOLINE RANGE ORGANICS BY EPA 5030/8015B									
Gasoline-Range Organics	ND		mg/kg dry	0.12	0.12	1	03/30/15	03/30/15 20:49	ECM
Surrogate: a,a,a-Trifluorotoluene			*85-115*	*103 %*	*03/30/15*		*03/30/15 20:49*		
DIESEL RANGE ORGANICS BY EPA 3540/8015B									
Diesel-Range Organics	**64.3**		mg/kg dry	9.4	9.4	1	03/28/15	03/29/15 18:42	CMK
Surrogate: o-Terphenyl			*70-130*	*102 %*	*03/28/15*		*03/29/15 18:42*		
PERCENT SOLIDS									
Percent Solids	**85**		%			1	03/27/15	03/28/15 14:04	WB
Metals									
Silver	ND		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Arsenic	**9.28**		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Barium	**135**		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Cadmium	**0.771**		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Chromium	**13.9**		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Mercury	**0.365**		mg/kg dry	0.0941	0.0941	2	04/01/15	04/02/15 13:55	CHK
Lead	**161**		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Selenium	**1.04**		mg/kg dry	0.471	0.471	2	04/01/15	04/02/15 13:55	CHK
Wet Chemistry									
% Solids	**81.7**		%	1.00	1.00	1	04/01/15	04/01/15 10:39	CMA

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 5-6'

5032712-04RE1 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS)									
Acetone	**42.9**		ug/kg dry	11.8	11.8	1	03/30/15	03/30/15 19:07	WB
tert-Amyl alcohol (TAA)	ND		ug/kg dry	58.8	58.8	1	03/30/15	03/30/15 19:07	WB
tert-Amyl methyl ether (TAME)	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Benzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Bromobenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Bromochloromethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Bromodichloromethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Bromoform	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Bromomethane	ND		ug/kg dry	5.9	5.9	1	03/30/15	03/30/15 19:07	WB
tert-Butanol (TBA)	ND		ug/kg dry	58.8	58.8	1	03/30/15	03/30/15 19:07	WB
2-Butanone (MEK)	ND		ug/kg dry	11.8	11.8	1	03/30/15	03/30/15 19:07	WB
n-Butylbenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
sec-Butylbenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
tert-Butylbenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Carbon disulfide	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Carbon tetrachloride	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Chlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Chloroethane	ND		ug/kg dry	5.9	5.9	1	03/30/15	03/30/15 19:07	WB
Chloroform	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Chloromethane	ND		ug/kg dry	5.9	5.9	1	03/30/15	03/30/15 19:07	WB
2-Chlorotoluene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
4-Chlorotoluene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,2-Dibromo-3-chloropropane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Dibromochloromethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,2-Dibromoethane (EDB)	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Dibromomethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,2-Dichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,3-Dichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,4-Dichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Dichlorodifluoromethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,1-Dichloroethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,2-Dichloroethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,1-Dichloroethene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 5-6'

5032712-04RE1 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									
cis-1,2-Dichloroethene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
trans-1,2-Dichloroethene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Dichlorofluoromethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,2-Dichloropropane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,3-Dichloropropane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
2,2-Dichloropropane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,1-Dichloropropene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
cis-1,3-Dichloropropene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
trans-1,3-Dichloropropene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Diisopropyl ether (DIPE)	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Ethyl tert-butyl ether (ETBE)	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Ethylbenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Hexachlorobutadiene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
2-Hexanone	ND		ug/kg dry	11.8	11.8	1	03/30/15	03/30/15 19:07	WB
Isopropylbenzene (Cumene)	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
4-Isopropyltoluene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Methyl tert-butyl ether (MTBE)	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
4-Methyl-2-pentanone	ND		ug/kg dry	11.8	11.8	1	03/30/15	03/30/15 19:07	WB
Methylene chloride	ND		ug/kg dry	11.8	11.8	1	03/30/15	03/30/15 19:07	WB
Naphthalene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
n-Propylbenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Styrene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,1,1,2-Tetrachloroethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,1,2,2-Tetrachloroethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Tetrachloroethene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Toluene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,2,3-Trichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,2,4-Trichlorobenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,1,1-Trichloroethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,1,2-Trichloroethane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Trichloroethene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Trichlorofluoromethane (Freon 11)	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,2,3-Trichloropropane	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB

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Analytical Results

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Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-2 5-6'

5032712-04RE1 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									
1,2,4-Trimethylbenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
1,3,5-Trimethylbenzene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Vinyl chloride	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
o-Xylene	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
m- & p-Xylenes	ND		ug/kg dry	5.9	2.4	1	03/30/15	03/30/15 19:07	WB
Surrogate: 1,2-Dichloroethane-d4			*80-120*	*97 %*			*03/30/15*	*03/30/15 19:07*	
Surrogate: Toluene-d8			*81-117*	*102 %*			*03/30/15*	*03/30/15 19:07*	
Surrogate: 4-Bromofluorobenzene			*74-121*	*89 %*			*03/30/15*	*03/30/15 19:07*	

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Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 3-4'

5032712-05 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS)									
Acetone	**38.6**		ug/kg dry	11.9	11.9	1	03/27/15	03/27/15 21:33	WB
tert-Amyl alcohol (TAA)	ND		ug/kg dry	59.5	59.5	1	03/27/15	03/27/15 21:33	WB
tert-Amyl methyl ether (TAME)	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Benzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Bromobenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Bromochloromethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Bromodichloromethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Bromoform	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Bromomethane	ND		ug/kg dry	6.0	6.0	1	03/27/15	03/27/15 21:33	WB
tert-Butanol (TBA)	ND		ug/kg dry	59.5	59.5	1	03/27/15	03/27/15 21:33	WB
2-Butanone (MEK)	ND		ug/kg dry	11.9	11.9	1	03/27/15	03/27/15 21:33	WB
n-Butylbenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
sec-Butylbenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
tert-Butylbenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Carbon disulfide	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Carbon tetrachloride	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Chlorobenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Chloroethane	ND		ug/kg dry	6.0	6.0	1	03/27/15	03/27/15 21:33	WB
Chloroform	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Chloromethane	ND		ug/kg dry	6.0	6.0	1	03/27/15	03/27/15 21:33	WB
2-Chlorotoluene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
4-Chlorotoluene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,2-Dibromo-3-chloropropane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Dibromochloromethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,2-Dibromoethane (EDB)	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Dibromomethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,2-Dichlorobenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,3-Dichlorobenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,4-Dichlorobenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Dichlorodifluoromethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,1-Dichloroethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,2-Dichloroethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,1-Dichloroethene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 3-4'

5032712-05 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									
cis-1,2-Dichloroethene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
trans-1,2-Dichloroethene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Dichlorofluoromethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,2-Dichloropropane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,3-Dichloropropane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
2,2-Dichloropropane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,1-Dichloropropene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
cis-1,3-Dichloropropene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
trans-1,3-Dichloropropene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Diisopropyl ether (DIPE)	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Ethyl tert-butyl ether (ETBE)	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Ethylbenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Hexachlorobutadiene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
2-Hexanone	ND		ug/kg dry	11.9	11.9	1	03/27/15	03/27/15 21:33	WB
Isopropylbenzene (Cumene)	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
4-Isopropyltoluene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Methyl tert-butyl ether (MTBE)	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
4-Methyl-2-pentanone	ND		ug/kg dry	11.9	11.9	1	03/27/15	03/27/15 21:33	WB
Methylene chloride	ND		ug/kg dry	11.9	11.9	1	03/27/15	03/27/15 21:33	WB
Naphthalene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
n-Propylbenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Styrene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,1,1,2-Tetrachloroethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,1,2,2-Tetrachloroethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Tetrachloroethene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Toluene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,2,3-Trichlorobenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,2,4-Trichlorobenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,1,1-Trichloroethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,1,2-Trichloroethane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Trichloroethene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Trichlorofluoromethane (Freon 11)	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,2,3-Trichloropropane	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB

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Analytical Results

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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 3-4'

5032712-05 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									
1,2,4-Trimethylbenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
1,3,5-Trimethylbenzene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Vinyl chloride	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
o-Xylene	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
m- & p-Xylenes	ND		ug/kg dry	6.0	2.4	1	03/27/15	03/27/15 21:33	WB
Surrogate: 1,2-Dichloroethane-d4			*80-120*	*99 %*		*03/27/15*		*03/27/15 21:33*	
Surrogate: Toluene-d8			*81-117*	*100 %*		*03/27/15*		*03/27/15 21:33*	
Surrogate: 4-Bromofluorobenzene			*74-121*	*92 %*		*03/27/15*		*03/27/15 21:33*	
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS)									
Acenaphthene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Acenaphthylene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Anthracene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Benzo[a]anthracene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Benzo[b]fluoranthene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Benzo[k]fluoranthene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Benzo[ghi]perylene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Benzo[a]pyrene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
4-Bromophenyl phenyl ether	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Butyl benzyl phthalate	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Carbazole	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
4-Chloro-3-methylphenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
4-Chloroaniline	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Bis(2-chloroethoxy)methane	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Bis(2-chloroethyl) ether	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Bis(2-chloroisopropyl) ether	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2-Chloronaphthalene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2-Chlorophenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
4-Chlorophenyl phenyl ether	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Chrysene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Di-n-butyl phthalate	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Di-n-octyl phthalate	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Dibenzo[a,h]anthracene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Dibenzofuran	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 3-4'

5032712-05 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS) (continued)									
1,2-Dichlorobenzene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
1,3-Dichlorobenzene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
1,4-Dichlorobenzene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
3,3-Dichlorobenzidine	ND		ug/kg dry	600	600	1	03/27/15	03/30/15 16:39	WB
2,4-Dichlorophenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Diethyl phthalate	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Dimethyl phthalate	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2,4-Dimethylphenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2-Methyl-4,6-dinitrophenol	ND		ug/kg dry	1490	1490	1	03/27/15	03/30/15 16:39	WB
2,4-Dinitrophenol	ND		ug/kg dry	1490	1490	1	03/27/15	03/30/15 16:39	WB
2,4-Dinitrotoluene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2,6-Dinitrotoluene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Bis(2-ethylhexyl) phthalate	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Fluoranthene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Fluorene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Hexachlorobenzene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Hexachlorobutadiene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Hexachlorocyclopentadiene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Hexachloroethane	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Indeno[1,2,3-cd]pyrene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Isophorone	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2-Methylnaphthalene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
3&4-Methylphenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2-Methylphenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
N-Nitroso-di-n-propylamine	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
N-Nitrosodiphenylamine	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Naphthalene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2-Nitroaniline	ND		ug/kg dry	1490	1490	1	03/27/15	03/30/15 16:39	WB
3-Nitroaniline	ND		ug/kg dry	1490	1490	1	03/27/15	03/30/15 16:39	WB
4-Nitroaniline	ND		ug/kg dry	1490	1490	1	03/27/15	03/30/15 16:39	WB
Nitrobenzene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2-Nitrophenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
4-Nitrophenol	ND		ug/kg dry	1490	1490	1	03/27/15	03/30/15 16:39	WB

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Project Manager: David Bookbinder

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B-3 3-4'

5032712-05 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS) (continued)									
Pentachlorophenol	ND		ug/kg dry	1490	1490	1	03/27/15	03/30/15 16:39	WB
Phenanthrene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Phenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Pyrene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
1,2,4-Trichlorobenzene	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2,4,5-Trichlorophenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
2,4,6-Trichlorophenol	ND		ug/kg dry	300	120	1	03/27/15	03/30/15 16:39	WB
Surrogate: 2-Fluorophenol			*23-121*	*90 %*	*03/27/15*		*03/30/15 16:39*		
Surrogate: Phenol-d5			*24-113*	*86 %*	*03/27/15*		*03/30/15 16:39*		
Surrogate: Nitrobenzene-d5			*23-120*	*85 %*	*03/27/15*		*03/30/15 16:39*		
Surrogate: 2,4,6-Tribromophenol			*19-122*	*103 %*	*03/27/15*		*03/30/15 16:39*		
Surrogate: 2-Fluorobiphenyl			*30-115*	*93 %*	*03/27/15*		*03/30/15 16:39*		
Surrogate: Terphenyl-d14			*18-137*	*104 %*	*03/27/15*		*03/30/15 16:39*		
GASOLINE RANGE ORGANICS BY EPA 5030/8015B									
Gasoline-Range Organics	ND		mg/kg dry	0.12	0.12	1	03/30/15	03/30/15 21:25	ECM
Surrogate: a,a,a-Trifluorotoluene			*85-115*	*101 %*	*03/30/15*		*03/30/15 21:25*		
DIESEL RANGE ORGANICS BY EPA 3540/8015B									
Diesel-Range Organics	ND		mg/kg dry	9.5	9.5	1	03/28/15	03/29/15 19:09	CMK
Surrogate: o-Terphenyl			*70-130*	*83 %*	*03/28/15*		*03/29/15 19:09*		
PERCENT SOLIDS									
Percent Solids	**84**		%			1	03/27/15	03/28/15 14:04	WB

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Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 3-4'

5032712-05 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
Metals									
Silver	ND		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Arsenic	**2.06**		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Barium	**21.5**		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Cadmium	ND		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Chromium	**24.6**		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Mercury	ND		mg/kg dry	0.0956	0.0956	2	04/01/15	04/02/15 13:59	CHK
Lead	**6.62**		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Selenium	**0.521**		mg/kg dry	0.478	0.478	2	04/01/15	04/02/15 13:59	CHK
Wet Chemistry									
% Solids	**82.1**		%	1.00	1.00	1	04/01/15	04/01/15 10:39	CMA

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Analytical Results

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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 9-10'

5032712-06 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS)									**S-06**
Acetone	**105**		ug/kg dry	12.2	12.2	1	03/29/15	03/29/15 15:59	WB
tert-Amyl alcohol (TAA)	ND		ug/kg dry	61.0	61.0	1	03/29/15	03/29/15 15:59	WB
tert-Amyl methyl ether (TAME)	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Benzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Bromobenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Bromochloromethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Bromodichloromethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Bromoform	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Bromomethane	ND		ug/kg dry	6.1	6.1	1	03/29/15	03/29/15 15:59	WB
tert-Butanol (TBA)	ND		ug/kg dry	61.0	61.0	1	03/29/15	03/29/15 15:59	WB
2-Butanone (MEK)	**18.1**		ug/kg dry	12.2	12.2	1	03/29/15	03/29/15 15:59	WB
n-Butylbenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
sec-Butylbenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
tert-Butylbenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Carbon disulfide	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Carbon tetrachloride	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Chlorobenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Chloroethane	ND		ug/kg dry	6.1	6.1	1	03/29/15	03/29/15 15:59	WB
Chloroform	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Chloromethane	ND		ug/kg dry	6.1	6.1	1	03/29/15	03/29/15 15:59	WB
2-Chlorotoluene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
4-Chlorotoluene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,2-Dibromo-3-chloropropane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Dibromochloromethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,2-Dibromoethane (EDB)	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Dibromomethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,2-Dichlorobenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,3-Dichlorobenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,4-Dichlorobenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Dichlorodifluoromethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,1-Dichloroethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,2-Dichloroethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,1-Dichloroethene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 9-10'

5032712-06 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									**S-06**
cis-1,2-Dichloroethene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
trans-1,2-Dichloroethene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Dichlorofluoromethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,2-Dichloropropane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,3-Dichloropropane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
2,2-Dichloropropane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,1-Dichloropropene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
cis-1,3-Dichloropropene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
trans-1,3-Dichloropropene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Diisopropyl ether (DIPE)	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Ethyl tert-butyl ether (ETBE)	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Ethylbenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Hexachlorobutadiene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
2-Hexanone	ND		ug/kg dry	12.2	12.2	1	03/29/15	03/29/15 15:59	WB
Isopropylbenzene (Cumene)	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
4-Isopropyltoluene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Methyl tert-butyl ether (MTBE)	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
4-Methyl-2-pentanone	ND		ug/kg dry	12.2	12.2	1	03/29/15	03/29/15 15:59	WB
Methylene chloride	ND		ug/kg dry	12.2	12.2	1	03/29/15	03/29/15 15:59	WB
Naphthalene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
n-Propylbenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Styrene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,1,1,2-Tetrachloroethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,1,2,2-Tetrachloroethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Tetrachloroethene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Toluene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,2,3-Trichlorobenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,2,4-Trichlorobenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,1,1-Trichloroethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,1,2-Trichloroethane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Trichloroethene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Trichlorofluoromethane (Freon 11)	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,2,3-Trichloropropane	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 9-10'

5032712-06 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									**S-06**
1,2,4-Trimethylbenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
1,3,5-Trimethylbenzene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Vinyl chloride	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
o-Xylene	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
m- & p-Xylenes	ND		ug/kg dry	6.1	2.4	1	03/29/15	03/29/15 15:59	WB
Surrogate: 1,2-Dichloroethane-d4			*80-120*	*102 %*		*03/29/15*		*03/29/15 15:59*	
Surrogate: Toluene-d8			*81-117*	*111 %*		*03/29/15*		*03/29/15 15:59*	
Surrogate: 4-Bromofluorobenzene			*74-121*	*79 %*		*03/29/15*		*03/29/15 15:59*	
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS)									
Acenaphthene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Acenaphthylene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Anthracene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Benzo[a]anthracene	**1380**	J	ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Benzo[b]fluoranthene	**1730**		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Benzo[k]fluoranthene	**630**	J	ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Benzo[ghi]perylene	**650**	J	ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Benzo[a]pyrene	**1150**	J	ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
4-Bromophenyl phenyl ether	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Butyl benzyl phthalate	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Carbazole	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
4-Chloro-3-methylphenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
4-Chloroaniline	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Bis(2-chloroethoxy)methane	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Bis(2-chloroethyl) ether	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Bis(2-chloroisopropyl) ether	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2-Chloronaphthalene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2-Chlorophenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
4-Chlorophenyl phenyl ether	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Chrysene	**1450**	J	ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Di-n-butyl phthalate	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Di-n-octyl phthalate	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Dibenzo[a,h]anthracene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Dibenzofuran	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
1,2-Dichlorobenzene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB

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Analytical Results

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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 9-10'

5032712-06 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS) (continued)									
1,3-Dichlorobenzene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
1,4-Dichlorobenzene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
3,3-Dichlorobenzidine	ND		ug/kg dry	3050	3050	5	03/27/15	03/31/15 16:58	WB
2,4-Dichlorophenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Diethyl phthalate	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Dimethyl phthalate	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2,4-Dimethylphenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2-Methyl-4,6-dinitrophenol	ND		ug/kg dry	7620	7620	5	03/27/15	03/31/15 16:58	WB
2,4-Dinitrophenol	ND		ug/kg dry	7620	7620	5	03/27/15	03/31/15 16:58	WB
2,4-Dinitrotoluene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2,6-Dinitrotoluene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Bis(2-ethylhexyl) phthalate	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Fluoranthene	**2700**		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Fluorene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Hexachlorobenzene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Hexachlorobutadiene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Hexachlorocyclopentadiene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Hexachloroethane	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Indeno[1,2,3-cd]pyrene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Isophorone	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2-Methylnaphthalene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
3&4-Methylphenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2-Methylphenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
N-Nitroso-di-n-propylamine	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
N-Nitrosodiphenylamine	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Naphthalene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2-Nitroaniline	ND		ug/kg dry	7620	7620	5	03/27/15	03/31/15 16:58	WB
3-Nitroaniline	ND		ug/kg dry	7620	7620	5	03/27/15	03/31/15 16:58	WB
4-Nitroaniline	ND		ug/kg dry	7620	7620	5	03/27/15	03/31/15 16:58	WB
Nitrobenzene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2-Nitrophenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
4-Nitrophenol	ND		ug/kg dry	7620	7620	5	03/27/15	03/31/15 16:58	WB
Pentachlorophenol	ND		ug/kg dry	7620	7620	5	03/27/15	03/31/15 16:58	WB

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 9-10'

5032712-06 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
SEMIVOLATILE ORGANICS BY EPA METHOD 3540/8270D (GC/MS) (continued)									
Phenanthrene	**2130**		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Phenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Pyrene	**3440**		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
1,2,4-Trichlorobenzene	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2,4,5-Trichlorophenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
2,4,6-Trichlorophenol	ND		ug/kg dry	1520	610	5	03/27/15	03/31/15 16:58	WB
Surrogate: 2-Fluorophenol			*23-121*	*84 %*	*03/27/15*		*03/31/15 16:58*		
Surrogate: Phenol-d5			*24-113*	*85 %*	*03/27/15*		*03/31/15 16:58*		
Surrogate: Nitrobenzene-d5			*23-120*	*89 %*	*03/27/15*		*03/31/15 16:58*		
Surrogate: 2,4,6-Tribromophenol			*19-122*	*85 %*	*03/27/15*		*03/31/15 16:58*		
Surrogate: 2-Fluorobiphenyl			*30-115*	*90 %*	*03/27/15*		*03/31/15 16:58*		
Surrogate: Terphenyl-d14			*18-137*	*143 %*	*03/27/15*		*03/31/15 16:58*		
GASOLINE RANGE ORGANICS BY EPA 5030/8015B									
Gasoline-Range Organics	ND		mg/kg dry	0.12	0.12	1	03/30/15	03/30/15 22:02	ECM
Surrogate: a,a,a-Trifluorotoluene			*85-115*	*97 %*	*03/30/15*		*03/30/15 22:02*		
DIESEL RANGE ORGANICS BY EPA 3540/8015B									
Diesel-Range Organics	**130**		mg/kg dry	9.8	9.8	1	03/28/15	03/29/15 19:35	CMK
Surrogate: o-Terphenyl			*70-130*	*105 %*	*03/28/15*		*03/29/15 19:35*		
PERCENT SOLIDS									
Percent Solids	**82**		%			1	03/27/15	03/28/15 14:04	WB
Metals									
Silver	ND		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK
Arsenic	**4.10**		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK
Barium	**43.9**		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK
Cadmium	**0.657**		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK
Chromium	**14.7**		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK
Mercury	ND		mg/kg dry	0.0915	0.0915	2	04/01/15	04/02/15 14:03	CHK
Lead	**166**		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK
Selenium	**0.572**		mg/kg dry	0.457	0.457	2	04/01/15	04/02/15 14:03	CHK

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Analytical Results

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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3 9-10'

5032712-06 (Soil)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
Wet Chemistry									
% Solids	**81.0**		%	1.00	1.00	1	04/01/15	04/01/15 10:39	CMA

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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3

5032712-21 (Water)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS)									
Acetone	ND		ug/L	10.0	10.0	1	03/31/15	03/31/15 14:06	ECM
tert-Amyl alcohol (TAA)	ND		ug/L	20.0	20.0	1	03/31/15	03/31/15 14:06	ECM
tert-Amyl methyl ether (TAME)	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Benzene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Bromobenzene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Bromochloromethane	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Bromodichloromethane	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Bromoform	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Bromomethane	ND		ug/L	5.0	5.0	1	03/31/15	03/31/15 14:06	ECM
tert-Butanol (TBA)	ND		ug/L	15.0	15.0	1	03/31/15	03/31/15 14:06	ECM
2-Butanone (MEK)	ND		ug/L	10.0	10.0	1	03/31/15	03/31/15 14:06	ECM
n-Butylbenzene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
sec-Butylbenzene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
tert-Butylbenzene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Carbon disulfide	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Carbon tetrachloride	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Chlorobenzene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Chloroethane	ND		ug/L	5.0	5.0	1	03/31/15	03/31/15 14:06	ECM
Chloroform	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Chloromethane	ND		ug/L	5.0	5.0	1	03/31/15	03/31/15 14:06	ECM
2-Chlorotoluene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
4-Chlorotoluene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Dibromochloromethane	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,2-Dibromo-3-chloropropane	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,2-Dibromoethane (EDB)	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Dibromomethane	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,2-Dichlorobenzene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,3-Dichlorobenzene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,4-Dichlorobenzene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Dichlorodifluoromethane	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,1-Dichloroethane	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,2-Dichloroethane	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,1-Dichloroethene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM

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Will Brewington, Staff Chemist

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3

5032712-21 (Water)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									
cis-1,2-Dichloroethene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
trans-1,2-Dichloroethene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Dichlorofluoromethane	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,2-Dichloropropane	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,3-Dichloropropane	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
2,2-Dichloropropane	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,1-Dichloropropene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
cis-1,3-Dichloropropene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
trans-1,3-Dichloropropene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Diisopropyl ether (DIPE)	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Ethyl tert-butyl ether (ETBE)	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Ethylbenzene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Hexachlorobutadiene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
2-Hexanone	ND		ug/L	10.0	10.0	1	03/31/15	03/31/15 14:06	ECM
Isopropylbenzene (Cumene)	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
4-Isopropyltoluene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Methyl tert-butyl ether (MTBE)	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
4-Methyl-2-pentanone	ND		ug/L	10.0	10.0	1	03/31/15	03/31/15 14:06	ECM
Methylene chloride	ND		ug/L	10.0	10.0	1	03/31/15	03/31/15 14:06	ECM
Naphthalene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
n-Propylbenzene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Styrene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,1,1,2-Tetrachloroethane	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,1,2,2-Tetrachloroethane	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Tetrachloroethene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Toluene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,2,3-Trichlorobenzene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,2,4-Trichlorobenzene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,1,1-Trichloroethane	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,1,2-Trichloroethane	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Trichloroethene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Trichlorofluoromethane (Freon 11)	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,2,3-Trichloropropane	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM

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Analytical Results

Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

B-3

5032712-21 (Water)
Sample Date: 03/25/15

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									
1,2,4-Trimethylbenzene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
1,3,5-Trimethylbenzene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Vinyl chloride	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
o-Xylene	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
m- & p-Xylenes	ND		ug/L	5.0	2.0	1	03/31/15	03/31/15 14:06	ECM
Surrogate: 1,2-Dichloroethane-d4			*80-120*	*95 %*		*03/31/15*		*03/31/15 14:06*	
Surrogate: Toluene-d8			*88-110*	*98 %*		*03/31/15*		*03/31/15 14:06*	
Surrogate: 4-Bromofluorobenzene			*86-115*	*89 %*		*03/31/15*		*03/31/15 14:06*	
GASOLINE RANGE ORGANICS BY EPA 8015B									
Gasoline-Range Organics	ND		ug/L	100	100	1	04/01/15	04/01/15 17:56	ECM
Surrogate: a,a,a-Trifluorotoluene			*85-115*	*99 %*		*04/01/15*		*04/01/15 17:56*	
DIESEL RANGE ORGANICS BY EPA 3510/8015B									
Diesel-Range Organics	ND		mg/L	0.43	0.43	1	03/30/15	04/02/15 02:47	CMK
Surrogate: o-Terphenyl			*60-120*	*108 %*		*03/30/15*		*04/02/15 02:47*	

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Analytical Results

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Project: N QUINCY ST. PHASE II

Project Number: 23933-A
Project Manager: David Bookbinder

Reported:
04/03/15 16:02

Notes and Definitions

S-06	Surrogate recovery and/or internal standard area are outside control limits due to sample matrix effect as confirmed by reanalysis.
S-02	The surrogate recovery for this sample cannot be accurately quantified due to interference from coeluting organic compounds present in the sample extract.
S-01	The surrogate recovery for this sample is not available due to sample dilution required from high analyte concentration and/or matrix interference.
J	Detected but below the reporting limit; therefore, result is an estimated concentration (CLP J-Flag).
E	The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate (CLP E-flag).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Will Brewington, Staff Chemist

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APPENDIX IV

ANALYTICAL RESULTS TABLES

Table 1
Total Petroleum Hydrocarbons, Polychlorinated Biphenyls, and Volatile Organic Compounds Detected in Soil
N. Quincy Street Phase II
Environmental Site Assessment - ECS Proj. No. 23933-A
Arlington, VA

	Sample ID	B-1	B-1	B-2	B-2	B-3	B-3	B-4	B-4	B-5	B-5	B-6	B-6	B-7	B-7	B-7	B-8	B-8	B-9	B-9	B-10
	Sample Depth	1.5-2'	8-9'	1-2'	5-6'	3-4'	9-10'	1-2'	9-10'	3-4'	11-12'	3-4'	7-8'	3-4'	5-6'	6-7'	1-2'	11-12.5'	5-6'	12-Nov	3-4'
Chemical Name	**Sample Date**	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/26/2015	3/26/2015	3/26/2015	3/26/2015	3/26/2015	3/26/2015	3/26/2015	3/26/2015
Total Petroleum Hydrocarbons	**Screening Level (mg/kg)**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Diesel Range Organics	50**	**15.4**	nd	**239**	**64.3**	nd	**130**	**270.0**	**120**	**10300**	**223**	**2320**	**122**	**1990**	**199**	**44.2**	**9.5**	nd	nd	nd	nd
Gasoline Range Organics	50**	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	**450**	nd	**0.21**	**2.11**	nd	nd	nd	nd	nd	nd
Volatile Organic Compounds	**Screening Level (ug/kg)**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**
Acetone	3,200*	**24.9**	nd	nd	**42.9**	**38.6**	**105**	**26.1**	nd	nd	21.1	nd	**75.9**	**84**	**101**	**86.9**	nd	nd	nd	nd	nd
2-Butanone (MEK)	1,430*	nd	nd	nd	nd	nd	**18.1**	nd	nd	nd	nd	nd	nd	**14.6**	nd	**15**	nd	nd	nd	nd	nd
n-Butylbenzene	18,200*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	**403 J**	nd	nd	**4.5 J**	nd	nd	nd	nd	nd	nd
sec-Butylbenzene	36,500*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	**324 J**	nd	nd	**6.3**	nd	nd	nd	nd	nd	nd
4-Isopropyltoluene	ne	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	**5.5 J**	nd	nd	nd	nd	nd
Naphthalene	114*	nd	nd	nd	nd	nd	nd	nd	nd	**10200**	nd	**24200**	**7.2**	**325 E**	**13.3**	**34.7**	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	115*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	**7.7**	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	907*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	**3.7 J**	nd	nd	nd	nd	nd

Only compounds present at concentrations above the laboratory reporting limit
All results are in micrograms per Kilogram (ug/kg)
nd - below laboratory detection limit
ne - not established
na - not analyzed
* -Virginia Department of Environmental Quality, VRP Tier II Regional Screening Level (RSL) for Residential Unrestricted Site
**- VDEQ "clean fill with restrictions" threshold of 50 mg/kg
Bold Exceeds DEQ RSL

Table 2
Resource Conservation and Recovery Act (RCRA) 8 Metals in Soil
N. Quincy Street Phase II
Environmental Site Assessment ECS Proj. No. 23933-A
Arlington, VA

	Sample ID	B-1	B-1	B-2	B-2	B-3	B-3	B-4	B-4	B-5	B-5	B-6	B-6	B-7	B-7	B-7	B-8	B-8	B-9	B-9	B-10
	Sample Depth	1.5-2'	8-9'	1-2'	5-6'	3-4'	9-10'	1-2'	9-10'	3-4'	11-12'	3-4'	7-8'	3-4'	5-6'	6-7'	1-2'	11-12.5'	5-6'	12-Nov	3-4'
	Sample Date	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/26/2015	3/26/2015	3/26/2015	3/26/2015	3/26/2015	3/26/2015	3/26/2015	3/26/2015	3/26/2015
Chemical Name	**Screening Level (mg/kg)**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Arsenic	3.4*	**4.49**	**0.655**	**3.99**	**9.28**	**2.06**	**4.1**	**2.08**	**0.706**	**4.17**	**2.09**	**6.39**	**3.73**	**2.86**	**3.29**	**3.22**	**0.887**	**0.705**	**0.85**	**0.527**	**1.68**
Barium	1,500*	21.4	**103**	**29.9**	**135**	**21.5**	**43.9**	**38.5**	**34.9**	**38.4**	**53.2**	**132**	**53.9**	**86.2**	**33.3**	**40**	**83.4**	**45.7**	**51.2**	**148**	**4.44**
Cadmium	7.0*	nd	nd	nd	**0.771**	nd	**0.657**	nd	nd	nd	nd	**0.624**	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chromium	3.0*	**20.2**	**13.3**	**18.8**	**13.9**	**24.6**	**14.7**	**14.7**	**14.6**	**21**	**12.8**	**15.8**	**15.2**	**11.1**	**14.8**	**13.3**	**13.9**	**16.3**	**14.8**	**14.9**	**17.6**
Lead	270*	nd	**7.52**	**13.3**	**161**	**6.62**	**166**	**10.1**	**7.27**	**54.5**	**9.98**	**64.1**	**9.58**	**62**	**18**	**10.5**	**4.21**	**3.49**	**6.14**	**8.02**	**2.95**
Mercury	0.94*	nd	nd	nd	**0.365**	nd	nd	nd	nd	nd	nd	**0.0729**	nd	nd	nd	nd	nd	nd	nd	nd	nd
Selenium	5.1*	nd	**1.18**	**0.573**	**1.04**	**0.521**	**0.572**	**0.464**	**0.73**	**0.545**	**0.76**	**1.13**	**0.858**	**0.603**	<0.412	**0.431**	**0.666**	**1.47**	**1.45**	**1.05**	nd
Silver	1.58*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Only compounds present at concentrations above the laboratory reporting limit
All results are in milligrams per Kilogram (mg/kg)
nd - below laboratory detection limit
ne - not established
na - not analyzed
* -Virginia Department of Environmental Quality, VRP Tier II Regional Screening Level (RSL) for Residential Unrestricted Site
**- VDEQ "clean fill with restrictions" threshold of 50 mg/kg
Bold Exceeds DEQ RSL

Table 3
Semi-Volatile Organic Compounds
North Quincy Street Phase II
Environmental Site Assessment ECS Proj. No. 23933-A
Arlington, VA

	Sample ID	B-1	B-1	B-2	B-2	B-3	B-3	B-4	B-4	B-5	B-5	B-6	B-6	B-7	B-7	B-7	B-8	B-8	B-9	B-9	B-10
	Sample Depth	1.5-2'	8-9'	1-2'	5-6'	3-4'	9-10'	1-2'	9-10'	3-4'	11-12'	3-4'	7-8'	3-4'	5-6'	6-7'	1-2'	11-12.5'	5-6'	12-Nov	3-4'
	Sample Date	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/25/2015	3/26/2015	3/26/2015	3/26/2015	3/26/2015	3/26/2015	3/26/2015	3/26/2015	3/26/2015
Chemical Name	**Screening Level (ug/kg)**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**
Acenaphthene	32,100*	nd	nd	nd	nd	nd	nd	nd	nd	**60100**	nd	**33800**	nd	**2500 J**	**250 J**	nd	nd	nd	nd	nd	nd
Anthracene	354,000*	nd	nd	**910 J**	nd	nd	nd	nd	nd	**115000**	nd	**41500**	nd	**4470 J**	**210 J**	nd	nd	nd	nd	nd	nd
Benzo[a]anthracene	1,500*	nd	nd	**2510**	**270 J**	nd	**1380 J**	nd	nd	**312000**	**330**	**144000**	**370**	**14500**	**520**	**330**	nd	nd	nd	nd	nd
Benzo[b]fluoranthene	1,500*	nd	nd	**3260**	**360**	nd	**1730**	nd	nd	**436000**	**490**	**222000**	**560**	**19800**	**600**	**450**	nd	nd	nd	nd	nd
Benzo[k]fluoranthene	15,000*	nd	nd	**1230 J**	**140 J**	nd	**630 J**	nd	nd	**169000**	**180 J**	**80200**	**200 J**	**6920**	**210 J**	**160 J**	nd	nd	nd	nd	nd
Benzo[ghi]perylene	170,000*	nd	nd	**1190 J**	nd	nd	**650 J**	nd	nd	**209000**	**160 J**	**126000**	**200 J**	**10200**	**220 J**	**160 J**	nd	nd	nd	nd	nd
Benzo[a]pyrene	150*	nd	nd	**2060**	**240 J**	nd	**1150 J**	nd	nd	**282000**	**320**	**153000**	**360**	**12800**	**400**	**300**	nd	nd	nd	nd	nd
Carbazole	ne	nd	nd	nd	nd	nd	nd	nd	nd	**70700**	nd	**24900**	nd	**2640 J**	nd	nd	nd	nd	nd	nd	nd
Chrysene	150,00*	nd	nd	**2540**	**310**	nd	**1450 J**	nd	nd	**315000**	**390**	**158000**	**400**	**15100**	**490**	**370**	nd	nd	nd	nd	nd
Dibenzo[a,h]anthracene	150*	nd	nd	nd	nd	nd	nd	nd	nd	**54600**	nd	**31300**	nd	nd	nd	nd	nd	nd	nd	nd	nd
Dibenzofuran	870*	nd	nd	nd	nd	nd	nd	nd	nd	**39000**	nd	**11100 J**	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluoranthene	230,000*	nd	nd	**5440**	**620**	nd	**2700**	**1300 J**	nd	**697000**	**720**	**331000**	**790**	**27000**	**1330**	**690**	nd	nd	nd	nd	nd
Fluorene	31,900*	nd	nd	nd	**140 J**	nd	nd	nd	nd	**71000**	nd	**23900**	nd	**2500 J**	**150 J**	nd	nd	nd	nd	nd	nd
Indeno[1,2,3-cd]pyrene	1,500*	nd	nd	**1040 J**	nd	nd	nd	nd	nd	**169000**	**140 J**	**103000**	**180 J**	**8240**	**210 J**	**130 J**	nd	nd	nd	nd	nd
2-Methylnaphthalene	1,100*	nd	nd	nd	nd	nd	nd	nd	nd	**15600 J**	nd	nd	nd	nd	**150 J**	**210 J**	nd	nd	nd	nd	nd
Naphthalene	114*	nd	nd	nd	**180 J**	nd	nd	nd	nd	**52400**	nd	**12400 J**	nd	nd	nd	**130 J**	nd	nd	nd	nd	nd
Phenanthrene	34,900*	nd	nd	**3710**	**550**	nd	**2130**	nd	nd	**530000**	**450**	**163000**	**360**	**17700**	**900**	**390**	nd	nd	nd	nd	nd
Pyrene	90,300*	nd	nd	**5350**	**570**	nd	**3440**	**2020 J**	nd	**752000**	**800**	**479000 E**	**940**	**38800**	**1780**	**700**	nd	nd	nd	nd	nd

Only compounds present at concentrations above the laboratory reporting limit
All results are in micrograms per Kilogram (ug/kg)
nd - below laboratory detection limit
ne - not established
na - not analyzed
* -Virginia Department of Environmental Quality, VRP Tier II Regional Screening Level (RSL) for Residential Unrestricted Site
Bold Exceeds DEQ RSL

Table 4
Total Petroleum Hydrocarbons, Volatile Organic Compounds in Groundwater
N. Quincy Street Phase II
Environmental Site Assessment - ECS Proj. No. 23933-A
Arlington, VA

Total Petroleum Hydrocarbons Detected in Groundwater

	Sample ID	B-3	B-5	B-6	B-9	MW-A
	Sample Date	3/25/15	3/25/15	3/26/15	3/26/15	3/26/15
Chemical Name	**Reporting Limit (mg/L)**					
Diesel Range Organics	1.0**	nd	0.36	3.96	nd	0.22
Gasoline Range Organics	1.0**	nd	nd	nd	nd	nd

Volatile Organic Compounds Detected in Groundwater

	Sample ID	B-3	B-5	B-6	B-9	MW-A
	Sample Date	3/25/15	3/25/15	3/26/15	3/26/15	3/26/15
Chemical Name	**Screening Level (ug/L)**					
Acetone	1,400*	nd	nd	15.6	nd	nd
Naphthalene	0.61*	nd	nd	77.2	nd	nd

Only compounds present at concentrations above the laboratory reporting limit
nd - below laboratory detection limit

SECTION 02 4113 - SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The provisions of the Contract Documents apply to the work of this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of existing asphalt and/or concrete pavement, concrete and/or asphalt walks, curbs and gutters, and other exterior site items indicated or not indicated which interfere with the Work.

2. Removal and disposal of existing storm drainage pipe and appurtenances indicated. Filling of existing pipes to be abandoned in place.

1.3 DEFINITIONS

A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.

B. Remove and Salvage: Items indicated to be removed and salvaged remain the Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to Owner's designated storage area.

C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated.

D. Existing to Remain: Protect items indicated to remain against damage and soiling. When permitted by the Architect, items may be removed to a suitable, protected storage location and then cleaned and reinstalled in their original locations.

1.4 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, remove demolished materials from the site with further disposition at the Contractor's option.

B. Storage or sale of removed items or materials on-site will not be permitted.

C. Historical items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to the Owner, which may be encountered, remain the Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to the Owner.

1.5 SUBMITTALS

A. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by the Work.

B. Record drawings at Project closeout.

1. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.

C. Proposed dust-control measures.

D. Schedule of selective demolition activities indicating the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
2. Interruption of utility services.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Detailed sequence of selective demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
6. Locations of temporary partitions and means of egress.

E. Inventory of items to be removed and salvaged or turned over to Owner.

F. Landfill records indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements: All work shall comply with Federal, State and Local laws and regulations concerning hauling and disposal of demolition debris.

B. Notify the proper agencies prior to the start of work and obtain all necessary permits for this work.

1.7 PROJECT CONDITIONS

A. Owner assumes no responsibility for actual condition of items or structures to be demolished. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner to the extent practical. However, minor variations may occur due to Owner’s removal and salvage operations prior to the start of demolition work.

B. The location of existing underground utilities indicated is approximate only. Field locate all existing underground utilities in the area of work, regardless of whether or not they are indicated. Call “Miss Utility” prior to the start of demolition work for assistance in the location of existing underground utilities.

C. Should charted, uncharted or incorrectly charted utilities be encountered during demolition, contact the Architect immediately for instructions. Cooperate with Owner and utility companies to keep services and facilities in operation.

D. Do not interrupt existing utilities serving facilities occupied and used by the Owner and others, except when permitted in writing by the Owner. Provide acceptable temporary utility service as required to maintain Owner's operations.

1.8 SCHEDULING

A. Owner will occupy portions of the building immediately adjacent to the Work. Conduct selective demolition so that the Owner's operations will not be disrupted. Provide not less than 72 hours notice to Owner of activities that will affect Owner's operations.

B. Arrange selective demolition schedule so as not to interfere with Owner's on-site operations.

C. Notify and coordinate any required relocation and/or removal of existing underground utilities, poles, meters or other above ground appurtenances with the appropriate utility company (i.e. power, telephone, cable and natural gas/propane) prior to the start of selective demolition work.

1.9 PAYMENT FOR UTILITY REMOVAL / RELOCATIONS

A. Electric Service – shall be included in contract amount.

B. Phone Service – shall be included in contract amount.

C. Cable Television – shall be included in contract amount.

D. Gas – shall be included in contract amount.

E. Fiber Optic Lines – shall be included in contract amount.

F. Private Data – shall be included in contract amount

1.10 USE OF EXPLOSIVES

A. Do not use explosives to perform selective site demolition work.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Call "Miss Utility" prior to the start of demolition work for assistance in the location of existing underground utilities. Field locate all existing underground utilities in the area of work, regardless of whether or not they are indicated.

B. Should uncharted or incorrectly charted existing utilities be identified, contact the Architect immediately for instructions. Provide a scale drawing with the location of the uncharted or incorrectly charted utilities for use by the Architect in preparing additional direction.

C. Verify that utilities indicated as removed, abandoned and/or relocated have been disconnected and capped.

D. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

E. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged and turned over to the Owner.

3.2 PROTECTION OF PERSONS AND PROPERTY

A. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

B. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

C. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around selective demolition area.

1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.

2. Protect existing site improvements, appurtenances, and landscaping to remain.

D. Barricade areas of demolition occurring as part of this work, and post with warning lights as required by authorities having jurisdiction.

E. Protect structures, buildings, utilities, walks, pavements, existing vegetation and other facilities to remain from damage caused by settlement, lateral movement, undermining, washout and other hazards created by demolition operations.

3.3 POLLUTION CONTROLS

A. Perform all work in accordance with the requirements of the latest edition of the Virginia Erosion and Sediment Control Handbook and those of the local Erosion Control official.

B. Clean adjacent structures and improvements of dust, dirt, and debris caused by the Work. Return adjacent areas to condition existing before start of selective demolition.

3.4 DEMOLITION OF EXISTING FACILITIES

A. Asphalt Pavement

1. Remove asphalt concrete pavement by sawcutting to the full depth of the pavement. Provide neat sawcuts at the limits of pavement removal indicated.

B. Concrete Pavement, Walks and Curbs

1. Remove concrete pavement and walks to the nearest joint. Sawcut concrete if joints are not present adjacent to the area of demolition.

2. Sawcut concrete along straight lines to a depth of not less than 2 inches. Break out remainder of concrete, provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or sawcut entirely through concrete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Do not burn demolished materials or debris.

C. Transport and legally dispose of demolished materials off of Owner's property.

3.6 CLEANUP AND REPAIR

A. Upon completion of demolition work remove all tools, equipment and demolition materials from site. Remove demolition work area protection and leave areas clean.

B. Repair any demolition performed in excess of that required. Return elements of construction and surfaces to remain to the condition existing prior to the start of construction. Repair adjacent construction or surfaces soiled or damaged by demolition work.

END OF SECTION 02 4113

SECTION 03 01 30 - CONCRETE MODIFICATIONS AND REPAIR

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Removal of concrete and subsequent replacement and patching.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, chemical composition, physical properties, test data, and mixing, preparation, and application instructions.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's written instructions for minimum and maximum temperature requirements and other conditions for storage.

B. Store cementitious materials off the ground, under cover, and in a dry location.

C. Store aggregates covered and in a dry location; maintain grading and other required characteristics and prevent contamination.

1.4 FIELD CONDITIONS

A. Environmental Limitations for Epoxies: Do not apply when air and substrate temperatures are outside limits permitted by manufacturer. During hot weather, cool epoxy components before mixing, store mixed products in shade, and cool unused mixed products to retard setting. Do not apply to wet substrates unless approved by manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: For repair products, obtain each color, grade, finish, type, and variety of product from single source and from single manufacturer with resources to provide products of consistent quality in appearance and physical properties.

2.2 BONDING AGENTS

A. Epoxy Adhesive:
   1. The compound shall be a two (2) component, 100 percent solids, 100 percent reactive compound suitable for use on dry or damp surfaces.
   2. Product Selection:
      a. Euco Epoxy No. 452MV or No. 620 by the Euclid Chemical Company.
      b. Sikadur Hi-Mod by the Sika Chemical Corporation.
      c. REZI-WELD 1000 by W. R. Meadows

2.3 PATCHING MORTAR

A. Polymer-Modified, Cementitious Patching Mortar:
   1. Exposed Localized Slab Repairs - Less than 1/2 inch thickness: Polymer modified patch; minimum 6,500 psi compressive strength.
      a. Euco Thin Coat by Euclid Chemical Company.
      b. Durathin by L&M Construction Chemicals, Inc.
      c. MEADOW-PATCH T1 by W. R. Meadows.

2. Exposed Localized Slab Repairs - 1/2 inch to 2 inch thickness: Polymer modified patch; minimum 6,000 psi compressive strength.
   a. Euco Concrete Coat by Euclid Chemical Company.
   b. Duratop by L&M Construction Chemicals, Inc.
   c. MEADOW-CRETE GPS by W. R. Meadows.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ensure that supervisory personnel are on-site and on duty when concrete maintenance work begins and during its progress.

B. Protect persons, surrounding surfaces of building from harm resulting from concrete maintenance work.
   1. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials.
   2. Use only proven protection methods appropriate to each area and surface being protected.
   3. Contain dust and debris generated by concrete maintenance work and prevent it from reaching the public or adjacent surfaces.
   4. Provide supplemental sound-control treatment to isolate removal and dismantling work from other areas of the building.
   5. Protect adjacent surfaces and equipment by covering them with heavy polyethylene film and waterproof masking tape. If practical, remove items, store, and reinstall after potentially damaging operations are complete.
   6. Dispose of debris by legal means.

C. Preparation for Concrete Removal: Examine construction to be repaired to determine best methods to safely and effectively perform concrete maintenance work. Examine adjacent work to determine what protective measures will be necessary. Make explorations, probes, and inquiries as necessary to determine condition of construction to be removed in the course of repair.
   1. Provide and maintain shoring, bracing, and temporary structural supports as required to preserve stability and prevent unexpected or uncontrolled movement, settlement, or collapse of construction being demolished and construction and finishes to remain. Strengthen or add new supports when required during progress of removal work.

D. Preparation of Floor Joints for Repair: Saw-cut joints full width to edges and depth of spalls, but not less than 1 inch(25 mm) deep. Clean out debris and loose concrete; vacuum or blow clear with compressed air.

3.2 BONDING AGENT APPLICATION

A. Epoxy Bonding Agent: Apply to concrete by brush, roller, or spray according to manufacturer's written instructions, leaving no pinholes or other uncoated areas. Place patching mortar or concrete while epoxy is still tacky. If epoxy dries, recoat before placing patching mortar or concrete.

3.3 PATCHING MORTAR APPLICATION

A. Place patching mortar as specified in this article unless otherwise recommended in writing by manufacturer.

B. Pretreatment: Apply specified bonding agent.

C. Finishing: Allow surfaces of lifts that are to remain exposed to become firm and then finish to a surface matching adjacent concrete.
   1. Stage 1: Prepare smooth surface to receive sheet waterproofing.
   2. Stage 2: Fill remaining thickness following installation of sheet waterproofing.

D. Curing: Wet-cure cementitious patching materials, including polymer-modified cementitious patching materials, for not less than seven days by water-saturated absorptive cover.

3.4 FIELD QUALITY CONTROL

A. Manufacturers Field Service: Engage manufacturers' factory-authorized service representatives for consultation and Project-site inspection and to provide on-site assistance when requested by Owner.
   1. Have manufacturers' factory-authorized service representatives perform the following number of Project-site inspections to observe progress and quality of the Work, distributed over the period of product installation, regardless of on-site assistance requested by Owner.
      a. Bonding-Agent and Packaged Patching-Mortar Installation: inspections.

END OF SECTION

SECTION 033000 - CAST-IN-PLACE CONCRETE

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 cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, not limited to but including the following:
   1. Footings.
   2. Granular fill.
   3. Fine graded granular fill.
   4. Slab on grade.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

   1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

      a. Contractor's superintendent.
      b. Independent testing agency responsible for concrete design mixtures.
      c. Ready-mix concrete manufacturer.
      d. Concrete Subcontractor.
      e. Special concrete finish Subcontractor.

   2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, methods for achieving specified

floor and slab flatness and levelness floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

E. Final Inspection Certificate.

F. Samples: For vapor retarder.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, manufacturer, testing agency.

B. Welding certificates.

C. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Curing compounds.
6. Floor and slab treatments.
7. Bonding agents.
8. Adhesives.
9. Vapor retarders.
10. Semirigid joint filler.
11. Joint-filler strips.
12. Repair materials.

D. Material Test Reports: For the following, from a qualified testing agency:

1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

E. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

F. Field quality-control reports.

G. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

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.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4.

E. Mockups: Cast concrete slab-on-grade panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.

1. Build panel approximately 200 sq. ft. for slab-on-grade in the location indicated or, if not indicated, as directed by Architect.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

F. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.

b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete subcontractor.
e. Special concrete finish subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.9 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301.
2. ACI 117.

2.2 FORM-FACING MATERIALS

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

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. High-density overlay, Class 1 or better.
b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
c. Structural 1, B-B or better; mill oiled and edge sealed.
d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

E. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

F. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

G. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.

2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 60 percent.

B. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

C. Deformed-Steel Wire: ASTM A 1064.

D. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064, plain, fabricated from as-drawn steel wire into flat sheets.

2.4 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.5 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C 150, Type I or Type III.
2. Fly Ash: ASTM C 618, Class F or C.
3. Slag Cement: ASTM C 989, Grade 100 or 120.
4. Blended Hydraulic Cement: ASTM C 595, Type IP, portland-pozzolan cement.

C. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Lightweight Aggregate: ASTM C 330, 1-inch nominal maximum aggregate size.

E. Air-Entraining Admixture: ASTM C 260.

F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494, Type A.
2. Retarding Admixture: ASTM C 494, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

G. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494, Type C.

H. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

I. Water: ASTM C 94 and potable.

2.6 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A.

1. Maximum Permeance ASTM E96: 0.01 perms (English).
2. Provide standard accessories and tape for complete system.
3. Acceptable Products:
   a. Basis-of-Design: Stego Wrap (15-mil) Vapor Barrier by STEGO INDUSTRIES LLC.
   b. Perminator 15 mils by W.R. Meadows, Inc.
   c. Moistop Ultra 15 by Fortifiber.
4. Single ply polyethylene is prohibited.
5. Basis-of-Design Accessories:
   a. Seams:
      1) Stego Tape by Stego Industries LLC, www.stegoindustries.com.
   b. Penetrations of Vapor barrier:
      1) Stego Mastic by Stego Industries LLC, www.stegoindustries.com.
      2) Stego Tape by Stego Industries LLC, www.stegoindustries.com.
   c. Perimeter/edge seal:
      1) Stego Crete Claw by Stego Industries LLC, www.stegoindustries.com.
      2) Stego Term Bar by Stego Industries LLC, www.stegoindustries.com.
      3) StegoTack Tape (double sided) by Stego Industries LLC, www.stegoindustries.com.

2.7 FLOOR AND SLAB TREATMENTS

A. Slip-Resistive Emery Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive, 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 with 100 percent passing 3/8-inch sieve.

2.8 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

2.9 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

2.10 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 according to ASTM D 2240.

C. Bonding Agent: ASTM C 1059, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

2.11 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.

3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109.

2.12 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Slag Cement: 50 percent.
4. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use high-range water-reducing or plasticizing 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.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

E. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Normal-weight concrete.

1. Minimum Compressive Strength: As indicated at 28 days.
2. Maximum W/C Ratio: 0.45.
3. Slump Limit: 5 inches, plus or minus 1 inch.
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

B. Foundation Walls: Normal-weight concrete.

1. Minimum Compressive Strength: As indicated at 28 days.
2. Maximum W/C Ratio: 0.45.
3. Slump Limit: 5 inches, plus or minus 1 inch.
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

C. Slabs-on-Grade: Normal-weight concrete.

1. Minimum Compressive Strength: As indicated at 28 days.
2. Maximum W/C Ratio: 0.45.
3. Minimum Cementitious Materials Content: 520 lb/cu. yd.
4. Slump Limit: 5 inches, plus or minus 1 inch.
5. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
6. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
7. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

D. Suspended Slabs: Lightweight concrete.

1. Minimum Compressive Strength: As indicated at 28 days.
2. Calculated Equilibrium Unit Weight: 115 lb/cu. ft., plus or minus 3 lb/cu. ft. as determined by ASTM C 567.
3. Slump Limit: 5 inches, plus or minus 1 inch.
4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.14 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.15 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.

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 mixer capacity 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 mixer capacity 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, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.
2. Class B, 1/4 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR-RETARDER INSTALLATION

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.
3. Overlap joints 6 inches and seal with manufacturer’s seam tape.
4. Apply seam tape to a clean and dry vapor barrier.
5. Seal all penetrations (including pipes) per manufacturer’s instructions.
6. Avoid the use of non-permanent stakes driven through vapor barrier.
7. If non-permanent stakes are driven through vapor barrier, repair as recommended by vapor barrier manufacturer.
8. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.

3.5 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Locate slabs.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. 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 does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.8 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.

1. Apply scratch finish to surfaces to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:

a. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

G. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:

1. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aggregate over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
2. After broadcasting and tamping, apply float finish.
3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.

3.10 MISCELLANEOUS CONCRETE ITEM INSTALLATION

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 4 inches high unless otherwise indicated, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
3. Minimum Compressive Strength: 4000 psi at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.11 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed 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.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

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 for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

    a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.

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.

    a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a 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. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.12 LIQUID FLOOR TREATMENT APPLICATION

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than 14 days' old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least [**one**] [**six**] month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.

3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. 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 provides 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.

3. Slump: ASTM C 143; 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.
4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete;one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C 1064, one test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compression Test Specimens: ASTM C 31.

    a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
    b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C 39; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

    a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every 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.

11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.
14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

E. Measure floor and slab flatness and levelness according to ASTM E 1155 within hours of finishing.

3.16 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION

SECTION 04 01 20 - MAINTENANCE OF UNIT MASONRY

PART 1 - GENERAL

1.1 SUMARY

A. Section includes maintenance of unit masonry consisting of concrete unit masonry restoration as follows:
   1. Repairing unit masonry, including replacing units.
   2. Painting steel uncovered during the work.
   3. Repointing joints.

1.2 QUALITY ASSURANCE

A. Restoration Specialist Qualifications: Engage an experienced masonry restoration firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience installing standard unit masonry is not sufficient experience for masonry restoration work.

B. Source Limitations: Obtain each type of material for masonry restoration from one source with resources to provide materials of consistent quality in appearance and physical properties.

C. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising performance and preventing damage due to worker fatigue.

PART 2 - PRODUCTS

2.1 MASONRY MATERIALS

A. Replacement CMU: Solid load-bearing; ASTM C 90.

2.2 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II.
   1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Factory-Prepared Lime Putty: ASTM C 1489.

D. Quicklime: ASTM C 5, pulverized lime.

E. Mortar Sand: ASTM C 144 unless otherwise indicated.
   1. For pointing mortar, provide sand with rounded edges.

G. Water: Potable.

2.3 FLASHINGS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
   1. Stainless Steel: ASTM A 240/A 240M, Type 304, 0.016 inch (0.4 mm) thick.
   2. Metal Drip Edges: Fabricate from stainless steel. Extend at least 3 inches (75 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed.

3. Metal Expansion-Joint Strips: Fabricate from stainless steel to shapes indicated.

B. Flexible Flashing:
   1. Flexible Stainless Steel:
      a. Products of manufacturers listed below meeting indicated standards and specified manufacturer's product data characteristics, except as modified below, are acceptable for use, subject to compliance with specified requirements:
         1) York Manufacturing, Inc.; Multi-Flash SS (Basis-of-Design)
         2) Illinois Products, Inc.; IPCO Stainless Steel Fabric Flashing
         3) Prosoco, Inc.; R-Guard SS ThruWall
         4) STS Coatings, Inc.; Gorilla Flash Stainless Fabric
         5) TK Products, Inc.; TK TWF
      b. Characteristics:
         1) Type: Stainless steel core with polymer fabric laminated to one stainless steel face with non-asphalt adhesive.
         2) Stainless steel type: 304, ASTM A167.
         3) Fabric: polymer fabric; laminated back face of stainless steel core.
         4) Size: Manufacturer's standard width rolls.
      c. Accessories:
         1) Mastic/sealant: Basis-of-Design: York Manufacturing, Inc.; UniverSeal US100.
            (a) Type: One part 100% solids, solvent-free formulated silyl-terminated polyether (STPE), ASTM C920-11, Type S, Grade NS, Class 50.
         2) Outside corner and inside corner material; manufacturer’s standard available units using:
            (a) Stainless steel: 26 gauge stainless steel.
         3) End Dam: Product may be folded in line with the flashing material or utilize preformed end dams by manufacturer using:
            (a) Stainless steel: 26 gauge stainless steel.
         4) Splice material: Basis-of-Design: York 304 SS by York; manufacturer’s standard self-adhered metal material; material matching system material or use Multi-Flash Stainless Steel 6” lap piece and polyether sealant as a splice.
         5) Termination Bar: Basis-of-Design: York T-96 termination bar; manufacturer's standard 1" composite material bar or a 1” 26 gauge stainless steel termination bar with sealant lip.

C. Stainless Steel Drip Plates:
   1. Provide at flexible flashing locations, as indicated.
   2. Material: Minimum 26 gage stainless steel.
   3. Flexible flashing will cover drip plate; cut flush with face of mortar joint.
   4. Bond flexible flashing to drip plate as recommended by flexible flashing manufacturer; product selection to ensure against adhesive drool beyond face of brick.

D. Drip Plate Fasteners - CMU Backup: Use low-velocity powder actuated ballistic point fastener with pre-mounted washer; submit ICC-ES Evaluation Report under product data submittals indicating fastener selection appropriate for intended use.

E. Self-adhering Flashing Seam Tape: Flexible stainless steel; stainless steel core with polymer fabric laminated to one stainless steel face with non-asphalt adhesive.

2.4 ACCESSORY MATERIALS

A. Cavity Vents: Polyester mesh or cellular insect-resistant vents.
   1. Manufacturers:
      a. CavClear/Archovations, Inc.
      b. Dur-O-Wal.
      c. Hohmann & Barnard, Inc.
      d. Mortar Net Solutions; Mortar Net Weep Vents.
      e. York Flashing.

B. Sealant Materials:
   1. Provide manufacturer's standard chemically curing, elastomeric sealant(s) of base polymer and characteristics indicated below that comply with applicable requirements in Section 079200 "Joint Sealants."
   2. Colors: Provide colors of exposed sealants to match colors of masonry adjoining installed sealant unless otherwise indicated.
   3. Ground-Mortar Aggregate: Custom crushed and ground pointing mortar sand or existing mortar retrieved from joints. Grind to a particle size that matches the adjacent mortar aggregate and color. Remove all fines passing the 100 sieve.

C. Joint-Sealant Backing:
   1. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) or Type B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
   2. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where acceptable.

2.4 MORTAR MIXES

A. Preparing Lime Putty: Slake quicklime and prepare lime putty according to appendix to ASTM C 5 and manufacturer's written instructions.

B. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
   1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.

C. Do not use admixtures in mortar unless otherwise indicated.

D. Rebuilding (Setting) Mortar: Comply with ASTM C 270, Proportion Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime.

PART 3 - EXECUTION

3.1 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work.

3.2 UNIT REMOVAL AND REPLACEMENT

A. At locations indicated, remove CMU indicated or that are damaged, spalled, or deteriorated or are to be reused. Carefully demolish or remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

B. Support and protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.

C. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.

D. Replace removed damaged units with solid CMU, matching existing size.

E. Lay replacement units with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding units. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.
   1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing work.
   2. Rake out mortar used for laying units before mortar sets and point new mortar joints in repaired area to comply with requirements for repointing existing masonry, and at same time as repointing of surrounding area.
   3. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.

3.3 PAINTING STEEL UNCOVERED DURING THE WORK

A. Inspect steel exposed during masonry removal. Where Architect determines that it is structural, or for other reasons cannot be totally removed, prepare and paint it as follows:
   1. Remove paint, rust, and other contaminants according SSPC-SP 3, "Power Tool Cleaning", as applicable to meet paint manufacturer's recommended preparation.
   2. Immediately paint exposed steel with two coats of antirust coating within interior masonry, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat); use galvanizing coating in exterioror walls.

B. If on inspection and rust removal, the cross section of a steel member is found to be reduced from rust by more than 1/16 inch (1.6 mm), notify Architect before proceeding.

3.4 REPOINTING MASONRY

A. Rake out and repoint joints to the following extent:
   1. All joints in areas indicated.
   2. Joints where mortar is missing or where they contain holes.
   3. Cracked joints where cracks can be penetrated at least 1/4 inch (6 mm) by a knife blade 0.027 inch (0.7 mm) thick.
   4. Cracked joints where cracks are 1/16 inch (1.6 mm) (3 mm) or more in width and of any depth.
   5. Joints where they sound hollow when tapped by metal object.
   6. Joints where they are worn back 1/4 inch (6 mm) or more from surface.
   7. Joints where they are deteriorated to point that mortar can be easily removed by hand, without tools.
   8. Joints where they have been filled with substances other than mortar.
   9. Joints indicated as sealant-filled joints.

B. Do not rake out and repoint joints where not required.

C. Rake out joints as follows:
   1. Remove mortar from joints to depth 2 times joint width, but not less than 1/2 inch (13 mm) or not less than that required to expose sound, unweathered mortar.
   2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
   3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.
      a. Cut out mortar by hand with chisel and resilient mallet. Do not use power-operated grinders without Architect's written approval based on approved quality-control program.
      b. Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar by hand with chisel and resilient mallet. Strictly adhere to approved quality-control program.

D. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.

E. Pointing with Mortar:
   1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
   2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch (9 mm) until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
   3. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than 3/8 inch (9 mm). Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
   4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
   5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours including weekends and holidays.
   6. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

F. Pointing with Sealant:
   1. After raking out, keep joints dry and free of mortar and debris.
   2. Clean and prepare joint surfaces according to Section 079200 "Joint Sealants." Prime joint surfaces unless sealant manufacturer recommends against priming. Do not allow primer to spill or migrate onto adjoining surfaces.
   3. Fill sealant joints with specified joint sealant according to Section 079200 "Joint Sealants" and the following:
      a. Install cylindrical sealant backing beneath the sealant, except where space is insufficient. There, install bond-breaker tape.
      b. Install sealant using only proven installation techniques that will ensure that sealant will be deposited in a uniform, continuous ribbon, without gaps or air pockets, and with complete wetting of the joint bond surfaces equally on both sides. Fill joint flush with surrounding masonry and matching the contour of adjoining mortar joints.

c. Install sealant as recommended by sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead:
d. Fill joints to a depth equal to joint width, but not more than 1/2 inch (13 mm) deep or less than 1/4 inch (6 mm) deep.
e. Immediately after first tooling, apply ground-mortar aggregate to sealant, gently pushing aggregate into the surface of sealant. Retool sealant to form smooth, uniform beads, slightly concave. Remove excess sealant and aggregate from surfaces adjacent to joint.
f. Do not allow sealant to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces, particularly rough textures. Remove excess and spillage of sealant promptly as the work progresses. Clean adjoining surfaces by the means necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes, as demonstrated in an approved mockup.

4. Cure sealant according to Section 079200 "Joint Sealants."

G. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.

3.5 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, spray applied at low pressure.

B. Wash adjacent woodwork and other nonmasonry surfaces. Use detergent and soft brushes or cloths.

C. Sweep and rake adjacent pavement and grounds to remove mortar and debris. Where necessary, pressure wash pavement surfaces to remove mortar, dust, dirt, and stains.

END OF SECTION

SECTION 051200

STRUCTURAL STEEL FRAMING

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. Structural steel.
2. Grout.

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.

2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand critical welds.

D. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, fabricator, professional engineer testing agency.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural steel, including chemical and physical properties.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Shop primers.
3. Nonshrink grout.

F. Survey of existing conditions.

G. Source quality-control reports.

H. Field quality-control and special inspection reports.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE or Category CSE.

C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1, Endorsement P2, Endorsement P3 or to SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

E. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and re-lubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC 360.
2. Use Allowable Stress Design; data are given at service-load level.

2.2 STRUCTURAL-STEEL MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. W-Shapes: ASTM A 992/A 992M, Grade 50.

C. Channels, Angles, ASTM A 36/A 36M.

D. Plate and Bar: ASTM A 36/A 36M.

E. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.

F. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.

1. Weight Class: As indicated.
2. Finish: Black except where indicated to be galvanized.

G. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.

B. Headed Anchor Rods: ASTM F 1554, Grade 55, weldable, straight.

1. Nuts: ASTM A 563 heavy-hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436, Type 1, hardened carbon steel.
4. Finish: Plain.

C. Threaded Rods: ASTM A 36/A 36M.

1. Nuts: ASTM A 563 heavy-hex carbon steel.
2. Washers: ASTM A 36/A 36M carbon steel.
3. Finish: Plain.

2.4 PRIMER

A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

B. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

2.5 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
   1. Fabricate beams with rolling camber up.
   2. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
   3. Mark and match-mark materials for field assembly.
   4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

   1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 3, "Power Tool Cleaning."

F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

   1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
   2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
   3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.7 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

   1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.8 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.
6. Surfaces enclosed in interior construction.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

2.9 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize lintels, shelf angles, and welded door frames attached to structural-steel frame and located in exterior walls.

2.10 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform shop tests and inspections.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

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

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Baseplates Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

3.6 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

D. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Rough hardware.

B. Loose bearing and leveling plates.

C. Loose steel lintels.

D. Shelf angles.

E. Steel framing and supports for mechanical and electrical equipment.

F. Steel framing and supports for applications where framing and supports are not specified in other Sections.

G. Miscellaneous metal trim.

H. Clearance signs.

I. Extruded aluminum sills.

1.2 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

C. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.

D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.

F. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015 (with March 2016 Errata).

1.3 QUALITY ASSURANCE

A. Fabricator Qualifications: Firm experienced in producing metal fabrications similar to those indicated for this Project with a record of successful in-service performance, and with sufficient production capacity to produce required units without delaying the Work.

B. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel," AWS D1.2 "Structural Welding Code--Aluminum," and AWS D1.3 "Structural Welding Code--Sheet Steel."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.4 SUBMITTALS

A. Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.

1. For installed products indicated to comply with design loads include structural analysis data and shop drawings signed by the qualified professional engineer responsible for their preparation.

B. Samples representative of materials and finished products as may be requested by Architect.

C. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

D. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include a list of completed projects with project name, addresses, names of architects and owners, and other information specified.

E. Qualification data for professional engineer responsible for designing fabrications indicated to comply with specific design loads.

1.5 PROJECT CONDITIONS

A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating products without field measurements. Coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

PART 2 PRODUCTS

2.1 MATERIALS - STEEL

A. Metal Surfaces, General:
1. For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes.
2. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
3. Recycled Content: Provide steel with at least 25 percent post-consumer recycled content.

B. Steel Sections: ASTM A 36/A 36M.

C. Steel Tubing: Product type (manufacturing method) and as follows:
1. Cold-Formed Steel Tubing: ASTM A 500.
2. Hot-Formed Steel Tubing: ASTM A 501.
a. For exterior installations and where indicated, provide tubing with hot-dip galvanized coating per ASTM A 53.

D. Plates: ASTM A283/A283M.

E. Steel Pipe: ASTM A 53, standard weight (schedule 40), unless otherwise indicated, or another weight required by structural loads.
1. Galvanized finish for exterior installations and where indicated.
2. Black finish elsewhere, unless otherwise indicated.

F. Gray-Iron Castings: ASTM A 48, Class 30.

G. Malleable-Iron Castings: ASTM A 47, Grade 32510 (ASTM A 47M, Grade 22010).

H. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a

safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.

I. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

2.2 MATERIALS - ALUMINUM

A. General:
1. Recycled Content: Give preference to aluminum with the highest recycled content feasible.
2. Regional Materials: Give preference to aluminum manufactured and of primary raw materials extracted or recovered within 500 mile radius of Project Site.

B. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632 (ASTM B 632M) Pattern 1, alloy 6061-T6.

2.3 PAINT

A. Shop Primer for Ferrous Metal - Interior Locations, Loose Lintels, Plates, etc.: Refer to Division 9 painting specifications.

B. Shop Finish - Exterior Fabrications (Stairs, Ladders, Frames, etc):
1. Prepare galvanized surfaces as required by paint manufacturer.
2. Electrostatic application of epoxy powder primer with 375f minimum 15 minute duration heat cure for maximum corrosion protection.
3. Immediate electrostatic application of TGIC polyester powder color coat while metal temperature is minimum of 300f and heat cure for minimum 10 minutes at 400f.
4. This process provides an average of 8-10 mils total coating thickness.
5. Color to be selected by Architect.

C. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with SSPC-Paint 20.

D. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers.

2.4 FASTENERS

A. General: Provide plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating, for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568, Property Class 4.6), with hex nuts, ASTM A 563 (ASTM A 563M), and, where indicated, flat washers.

C. Machine Screws: ANSI B18.6.3.

D. Lag Bolts: ANSI B18.2.1 (ANSI B18.2.3.8M).

E. Plain Washers: Round, carbon steel, ANSI B18.22.1 (ANSI B18.22M).

F. Lock Washers: Helical, spring type, carbon steel, ANSI B18.21.1.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Material - General: Carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material - Exposed exterior or in contract with ground: Group 1 alloy 304 or 316 stainless-steel bolts and nuts complying with ASTM F 593 (ASTM F 738M) and ASTM F 594 (ASTM F 836M).

H. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as required.

2.5 GROUT

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

B. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
1. Construction Grout; W. R. Bonsal Co.
2. Sure-grip High Performance Grout; Dayton Superior Corp.
3. Euco N-S Grout; Euclid Chemical Co.
4. Crystex; L & M Construction Chemicals, Inc.
5. Masterflow 928 and 713; Master Builders Technologies, Inc.
6. Sealtight 588 Grout; W. R. Meadows, Inc.
7. Sonogrout 14; Sonneborn Building Products--ChemRex, Inc.

2.6 FABRICATION

A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

C. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.
1. Temperature Change (Range): 120 deg F.

D. Shear and punch metals cleanly and accurately; remove burrs.

E. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

F. Remove sharp or rough areas on exposed traffic surfaces.

G. Weld corners and seams continuously to comply with the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

H. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

K. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

L. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

M. Fabricate items with joints tightly fitted and secured.

N. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

O. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.7 ROUGH HARDWARE

A. Furnish bent, or otherwise custom-fabricated, bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 Sections.

B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts that bear on wood structural connections, and furnish steel washers elsewhere.

2.8 LOOSE STEEL LINTELS

A. Fabricate loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

B. Weld adjoining members together to form a single unit where indicated.

C. Size loose lintels for equal bearing of 1 inch per foot of clear span but not less than 8 inches bearing at each side of openings, unless otherwise indicated.

D. Hot dip galvanize loose steel lintels located in exterior walls.

2.9 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of the required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

2.10 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports for applications indicated that are not a part of structural steel framework as required to complete the Work.

B. Fabricate units to sizes, shapes, and profiles indicated and required to receive other adjacent construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.
   1. Equip units with integrally welded anchors; furnish inserts if units must be installed after concrete is placed.
      a. Except as otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inch thick by 8 inches long.

C. Galvanize miscellaneous framing and supports in the following locations:
   1. Exterior locations.
   2. Interior locations where indicated.

2.11 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices wherever possible.

B. Provide cutouts, fittings, and anchorages as required to coordinate assembly and installation with other Work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 inches from each end, 6 inches from corners, and 24 inches o.c., unless otherwise indicated.

C. Galvanize miscellaneous steel trim in the following locations:
   1. Exterior locations.
   2. Interior locations where indicated.

2.12 CLEARANCE SIGNS

A. Message and colors to be provided by Architect, for overhead door canopy locations.

B. Minimum 0.063 inch thick aluminum plate with 3M engineer grade reflective sheeting, providing a minimum 70 percent visual contrast.

2.13 EXTRUDED ALUMINUM SILLS

A. Material: 0.090 inch extruded aluminum sills; length and profiled indicated by drawings.

B. Finish: AAMA 2605, containing not less than 70 percent PVDF resin by weight in color coat; match color of louver provided under mechanical.

2.14 FINISHES - STEEL AND IRON

A. Galvanizing: For those items indicated for galvanizing, apply zinc coating by the hot-dip process complying with the following requirements:
   1. ASTM A 153 for galvanizing iron and steel hardware.
   2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch (0.76 mm) thick or thicker.

B. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
   1. Exteriors (SSPC Zone 1B): SSPC-SP 6 "Commercial Blast Cleaning."
   2. Interiors (SSPC Zone 1A): SSPC-SP 3 "Power Tool Cleaning."

C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA 1 "Paint Application Specification No. 1" for shop painting.

2.15 FINISHES - ALUMINUM

A. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

B. As-Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).

C. Class I Natural Anodized Finish (unless indicated otherwise): AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

2.16 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.1 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installing anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

B. Set sleeves in concrete with tops flush with finish surface elevations. Protect sleeves from water and concrete entry.

3.2 INSTALLATION

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.

E. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.3 SETTING LOOSE PLATES

A. Clean concrete bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

B. Set loose leveling and bearing plates on wedges or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.
1. Use nonshrink, nonmetallic grout, unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
1. Apply by brush or spray to provide a 2.0-mil (0.05-mm) minimum dry film thickness.

B. For galvanized surfaces, clean welds, bolted connections, and abraded areas, and apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 07 92 00 - JOINT SEALANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Self-leveling pourable joint sealants.

C. Joint backings and accessories.

1.2 REFERENCE STANDARDS

A. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2018.

B. ASTM C834 - Standard Specification for Latex Sealants; 2017.

C. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012 (Reapproved 2017).

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

E. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2016.

F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

G. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).

H. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2018.

I. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2013.

J. SCAQMD 1168 - Adhesive and Sealant Applications; 1989 (Amended 2017).

K. SWRI (VAL) - SWR Institute Validated Products Directory; Current Edition.

1.3 SUBMITTALS

A. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.

1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
2. List of backing materials approved for use with the specific product.
3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
4. Substrates the product should not be used on.
5. Substrates for which laboratory adhesion and/or compatibility testing is required.
6. Sample product warranty.
7. Certification by manufacturer indicating that product complies with specification requirements.
8. SWRI Validation: Provide currently available sealant product validations as listed by SWRI (VAL) for specified sealants.

B. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

D. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

E. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.

F. Installation Plan: Submit at least four weeks prior to start of installation.

G. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.

H. Field Quality Control Plan: Submit at least two weeks prior to start of installation.

I. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.

J. Installation Log: Submit filled out log for each length or instance of sealant installed.

K. Field Quality Control Log: Submit filled out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.
   1. Manufacturer must designate a representative authorized to prepare a manufacturer’s certificate, indicating compatibility of materials intended for each application.

B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

D. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
   1. Adhesion Testing: In accordance with ASTM C794.
   2. Compatibility Testing: In accordance with ASTM C1087.
   3. Stain Testing: In accordance with ASTM C1248.
   4. Allow sufficient time for testing to avoid delaying the work.
   5. Deliver to manufacturer sufficient samples for testing.
   6. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
   7. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.

E. Installation Plan: Include schedule of sealed joints, including the following.
   1. Installation Log Form: Include the following data fields, with known information filled out.
      a. Substrates.
      b. Sealant used.
      c. Stated movement capability of sealant.
      d. Confirmation that primer was used.

e. Size and actual backing material used.
f. Date of installation.
g. Name of installer.
h. Actual joint width; provide space to indicate maximum and minimum width.
i. Actual joint depth to face of backing material at centerline of joint.
j. Air temperature.

F. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
1. Identification of testing agency.
2. Name(s) of sealant manufacturers' field representatives who will be observing
3. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
a. Substrate; if more than one type of substrate is involved in a single joint, provide two entries on form, for testing each sealant substrate side separately.
b. Test date.
c. Sealant used.
d. Stated movement capability of sealant.
e. Test method used.
f. Date of installation of field sample to be tested.
g. Date of test.
h. Copy of test method documents.
i. Age of sealant upon date of testing.
j. Test results, modeled after the sample form in the test method document.
k. Indicate use of photographic record of test.

G. Field Quality Control Plan:
1. Visual inspection of entire length of sealant joints.
2. Non-destructive field adhesion testing of sealant joints, except interior acrylic latex sealants.
a. For each different sealant and substrate combination, allow for one test every 12 inches in the first 10 linear feet of joint and one test every 24 inches thereafter.
b. If any failures occur in the first 10 linear feet, continue testing at 12 inch intervals at no extra cost to Owner.
3. Field testing agency's qualifications.
4. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.

H. Field Adhesion Test Procedures:
1. Allow sealants to fully cure as recommended by manufacturer before testing.
2. Have a copy of the test method document available during tests.
3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
a. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
4. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.

5. Evaluation of Field Adhesion Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.
    a. Document cleaning and preparation procedures used for passing tests, to serve as standard practice for Project.

I. Non-Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.
1. Record results on Field Quality Control Log.
2. Repair failed portions of joints.

J. Field Adhesion Tests of Joints: Test for adhesion using most appropriate method in accordance with ASTM C1521, or other applicable method as recommended by manufacturer.

1. Extent of Testing: Test completed and cured sealant joints as follows:
    a. Perform 10 tests for the first 1000 feet (300 m) of joint length for each kind of sealant and joint substrate.
    b. Perform 1 test for each 1000 feet (300 m) of joint length thereafter or 1 test per each floor per elevation.
2. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
3. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

K. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.5 PROJECT 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 (5 deg C).
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.

1.6 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period:
    a. Silicone Sealants: Twenty years from date of Substantial Completion for vertical applications.
    b. Silicone sealants for horizontal applications: Five years from date of substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.1 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
      a. Wall expansion and control joints.
      b. Joints between door, window, and other frames and adjacent construction.
      c. Joints between different exposed materials.
      d. Openings below ledge angles in masonry.
      e. Other joints indicated below.
   2. Interior Joints:Interior joints to be sealed include, but are not limited to, the following items.
      a. Joints between door, window, and other frames and adjacent construction.
      b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
         1) Exception: Such gaps and openings in gypsum board finished stud walls and suspended ceilings.
         2) Exception: Through-penetrations in sound-rated assemblies that are also fire-rated assemblies.
      c. Other joints indicated below.
   3. Do not seal the following types of joints:
      a. Intentional weepholes in masonry.
      b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
      c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
      d. Joints where installation of sealant is specified in another section.
      e. Joints between suspended panel ceilings/grid and walls.

B. Sound-Rated Assemblies: Walls and ceilings identified as "STC-rated", "sound-rated", or "acoustical".

2.2 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.
   1. Prohibit methylene chloride and perchloroethylene in sealants.

B. Installer must use primer for exterior assembly applications, including interior face of exterior wall joints, regardless if the manufacturer may otherwise relieve the installer of primer use under conditions within acceptable parameters; installer will only be relieved of primer use when manufacturer documents the application to be non-compliant to tested assembly.

C. Compatibility: Provide joint sealants, backings, 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.

D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range; allow custom colors for masonry joints.
F. Minimum movement joint width 1/4-inch; minimum non-moving joint 1/8-inch.

2.3 NONSAG JOINT SEALANTS

A. Use Type designations for identifying submittals and referencing in Installation Plan.
B. Type A - Non-Staining Silicone Sealant: ASTM C920, Grade NS; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: 50 percent movement in both extension and compression, minimum.
   2. Non-Staining when tested in accordance with ASTM C1248.
   3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
   4. Manufacturers:
      a. Dow Chemical Company; DOWSIL 795 Silicone Building Sealant: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
      b. Momentive Performance Materials; GE SCS 9000 Silpruf NB: www.siliconeforbuilding.com.
      c. Pecora Corporation; 311 NS.
      d. Tremco Commercial Sealants & Waterproofing; Spectrem 1: www.tremcosealants.com.
   5. Joint Locations:
      a. Exterior joints in vertical surfaces and horizontal non-traffic surfaces.
         1) Construction joints in cast-in-place concrete.
         2) Joints between plant-precast architectural concrete units.
         3) Control and expansion joints in unit masonry.
         4) Openings below ledge angles in masonry.
         5) Joints between different materials.
         6) Perimeter joints between materials listed above and frames of doors, frames and louvers.
         7) Control and expansion joints in soffits and other overhead surfaces.
      b. Interior joints.
         1) Control and expansion joints on exposed interior surfaces of exterior walls.
         2) Perimeter joints of exterior openings where indicated.
C. Type B - Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
   1. Manufacturers:
      a. Dow Corning Corporation; 786 Mildew Resistant: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
      b. Momentive Performance Materials; GE SCS 1700: www.siliconeforbuilding.com.
      c. Tremco Incorporated; Tremsil 200 Sanitary.
   2. Joint Locations:
      a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
      b. Tile control and expansion joints.
      c. Other joints as indicated.
D. Type C - Hybrid Urethane Sealant: ASTM C920, Grade NS; single component; not expected to withstand continuous water immersion or traffic.

1. Movement Capability: Plus and minus 35 percent, minimum.
2. Hardness Range: 20 to 40, Shore A, when tested in accordance with ASTM C661.
3. Color: Match adjacent finished surfaces.
4. Manufacturers:
   a. BASF; MasterSeal NP 100: www.master-builders-solutions.basf.us.
   c. Sherwin-Williams Company; Stampede 1H Hybrid Sealant: www.sherwin-williams.com/#sle.
   d. Tremco Commercial Sealants and Waterproofing; Dymonic FC: www.tremcosealants.com/#sle.
5. Joint Locations: Contractor may use either this Type C hybrid sealant or Type A silicone, at locations indicated under Type A; remain consistent throughout the project.

E. Type D - Non-Sag "Traffic-Grade" Polyurethane Sealant: ASTM C920, Grade NS; single or multi-component; explicitly approved by manufacturer for continuous water immersion and traffic without the necessity to recess sealant below traffic surface.
1. Movement Capability: Plus and minus 25 percent, minimum.
2. Hardness Range: 40 to 50, Shore A, when tested in accordance with ASTM C661.
3. Joint Locations: Interior joints in horizontal traffic surfaces.

F. Type E - Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
1. Manufacturers:
   a. BASF Building Systems; MasterSeal NP 520: www.master-builders-solutions.basf.us.
   b. Bostik, Inc.; Chem-Calk 600.
   c. Momentive Performance Materials; RCS 20 Siliconized Acrylic Sealant: www.siliconeforbuilding.com.
   d. Pecora Corporation; AC-20+.
   e. Sherwin-Williams; S-W Sher-Max Ultra Acrylic Sealant.
   f. Top Gun, a brand of PPG Architectural Coatings; Top Gun 200: www.ppgpaints.com.
   g. Tremco Commercial Sealants & Waterproofing; Tremflex 834: www.tremcosealants.com.
2. Joint Locations: Interior joints in vertical surfaces and horizontal non-traffic surfaces.
   a. Vertical joints on exposed surfaces of interior unit masonry or concrete walls and partitions.
   b. Perimeter joints between interior wall surfaces and frames of interior doors, lites and elevator entrances.
   c. Exposed joints in sound rated construction and exposed flanking sound paths, to be painted.

G. Type - F - Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
1. Products:
   a. Acoustical Solutions; OSI SC-175 Acoustical Caulk: www.acousticalsolutions.com.
   b. Franklin International, Inc; Titebond GREENchoice Professional Acoustical Smoke and Sound Sealant: www.titebond.com.
   c. Tremco Commercial Sealants & Waterproofing; Acoustical/Curtainwall Sealant: www.tremcosealants.com.
   c. USG Sheet Rock Brand; Acoustical Sealant: www.usg.com.
2. Joint Locations: Covered or concealed joints in sound rated construction; covered or concealed flanking sound paths.

2.4 SELF-LEVELING SEALANTS

A. Type G - Self-Leveling Polyurethane Sealant: ASTM C920, Grade P; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
   3. Manufacturers:
      a. BASF Building Systems; MasterSeal SL 2 or SL 100: www.master-builders-solutions.basf.us.
      b. The QUIKRETE Companies; QUIKRETE® Polyurethane Self-Leveling Sealant: www.quikrete.com.
      c. Sherwin-Williams; S-W Loxon SL2 Self-Leveling Smooth Polyurethane Sealant.
      d. Tremco Commercial Sealants & Waterproofing; THC-901 or Vulkem 445SSL.
   4. Joint Locations: Exterior joints in horizontal traffic surfaces.

B. Type H - Self-Leveling Polyurethane Sealant for Horizontal Expansion Joints: ASTM C920, Grade P, Uses T, M and O; multi-component; explicitly approved by manufacturer for horizontal expansion joints.
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 30 to 35, Shore A, when tested in accordance with ASTM C661.
   3. Tensile Strength: 200 to 250 psi in accordance with ASTM D412.
   4. Manufacturers:
      a. BASF Building Systems; MasterSeal SL 2: www.master-builders-solutions.basf.us.
      b. Sherwin-Williams; S-W Loxon SL2 Self-Leveling Smooth Polyurethane Sealant
      c. Tremco Commercial Sealants & Waterproofing; THC-901 or Vulkem 445SSL: www.tremcosealants.com.
   5. Joint Locations: Exterior expansion joints in horizontal traffic surfaces.

C. Type I - Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
   1. Composition: Multi-component, 100 percent solids by weight.
   2. Durometer Hardness: Minimum of 85 for Type A or 35 for Type D, after seven days when tested in accordance with ASTM D2240.
   3. Color: Concrete gray.
   4. Joint Width, Minimum: 1/8 inch.
   5. Joint Width, Maximum: 1/4 inch.
   6. Joint Depth: Provide product suitable for joints from 1/8 inch to 2 inches in depth including space for backer rod.
   7. Manufacturers:
      a. BASF Building Systems; MasterSeal CR 190: www.master-builders-solutions.basf.us.
      b. Dayton Superior Corporation; Pro-Poxy P606: www.daytonsuperior.com/#sle.
      c. Euclid Chemical Company; EUCO 700: www.euclidchemical.com/#sle.
      d. Nox-Crete; DynaFlex 502: www.nox-crete.com/#sle.
      e. W.R. Meadows, Inc; Rezi-Weld Flex: www.wrmeadows.com/#sle.

D. Type J - Semi-Rigid Self-Leveling Polyurea Joint Filler: Two-component, 100 percent solids; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.

1. Durometer Hardness, Type A: 75, minimum, after seven days when tested in accordance with ASTM D2240.
2. Color: Concrete gray.
3. Joint Width, Minimum: 1/8 inch.
4. Joint Width, Maximum: 3/4 inch.
5. Joint Depth: Provide product suitable for joints from 1/8 inch to 1 inch in depth excluding space for backer rod.
6. Manufacturers:
   a. Adhesives Technology Corporation; Crackbond JF-311: www.atcepoxy.com/#sle.
   b. ARDEX Engineered Cements; ARDEX ARDISEAL RAPID PLUS: www.ardexamericas.com/#sle.
   c. BASF Building Systems; MasterSeal CR 100: www.master-builders-solutions.basf.us.
   d. Euclid Chemical Company; EUCO QWIKjoint UVR: www.euclidchemical.com/#sle.
   d. Nox-Crete; DynaFlex JF-85: www.nox-crete.com/#sle.
   e. SpecChem, LLC; Rapid Flex CJ: www.specchemllc.com/#sle.

2.5 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
   1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
   2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
   3. Open Cell: 40 to 50 percent larger in diameter than joint width.
   4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Secondary Joint Backing: Precompressed foam seals; refer to Section 07 91 00 - Preformed Joint Seals.

D. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

E. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
   1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
   2. Notify Architect of date and time that tests will be performed, at least 7 days in advance.
   3. Arrange for sealant manufacturer's technical representative to be present during tests.

4. Record each test on Preinstallation Adhesion Test Log as indicated.
5. If any sample fails, review products and installation procedures, consult manufacturer, or take whatever other measures are necessary to ensure adhesion; re-test in a different location; if unable to obtain satisfactory adhesion, report to Architect.
6. After completion of tests, remove remaining sample material and prepare joint for new sealant installation.

3.2 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints and prime, in accordance with manufacturer's instructions.

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

E. Refer to preparation procedures documented by preconstruction testing, in producing acceptable results.

3.3 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Perform acoustical sealant application work in accordance with ASTM C919.

D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.

3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Install bond breaker backing tape where backer rod cannot be used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

I. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. 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 so installations with repaired areas are indistinguishable from original work.

END OF SECTION

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Thermally insulated hollow metal doors with frames.

1.2 REFERENCE STANDARDS

A. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.

B. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.

C. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.

E. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2016.

F. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2017.

G. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2016.

H. ITS (DIR) - Directory of Listed Products; current edition.

I. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.

J. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.

1.3 SUBMITTALS

A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

B. Shop Drawings: Details of each opening, showing elevations, frame profiles, and any indicated finish requirements.

1. Submit door and frame schedule using reference designations indicated on Drawings. Include opening size(s), handing of doors, details of each frame type, elevations of door design types, location, hardware set numbers, details of splice connections, grout guard detail, hardware mounting locations, welding details, internal reinforcing and anchor details.
2. As part of the shop drawing submittal, provide copies of the following:
   a. ANSI/A250.11-2012 - Recommended Erection Instructions for Steel Frames
   b. HMMA-820, TN01-03 - Grouting Hollow Metal Frames
   c. HMMA-840, TN01-07 - Painting Hollow Metal Products
   d. HMMA-810, TN01-03 - Defining Undercuts

C. Manufacturer's Qualification Statement.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.

B. Supplier Qualifications:
   1. Supplier must maintain at the location which will be managing the project, a credentialed Architectural Hardware Consultant (AHC) or Certified Door Consultant (CDC) as a full time employee, and member in good standing of DHI - Door Security + Safety Professionals.
   2. Architectural Hardware Consultant (AHC) or Certified Door Consultant (CDC) to supervise other individuals employed by the supplier who work on the project and be available throughout the Project to meet with the Contractor, Architect or Owner as needed.
   3. Supplier must be experienced and have completed projects with material, design and scope similar to that specified for this project. If requested by the Owner or Architect, submit a list of projects completed in the last five years with the project name, location, owner, architect and contractor.
   4. Supplier must maintain an office and warehouse complete with a hollow metal inventory within a 100 mile radius of the jobsite. Supplier to further have a qualified field service staff available to service the Project.

C. Maintain at project site copies of reference standards relating to installation of products specified.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store doors vertically in a dry area, under proper cover. Place the units on 4" high wood sills on floors in a manner that will prevent rust and damage. Avoid storage in non-vented plastic or canvas shelters, which create a humidity chamber and promote rusting. If the door becomes wet, or moisture appears, remove protective wrapping immediately. Provide a 4" space between the doors to permit air circulation. Proper storage is required to meet the requirements of ANSI/SDI A250.10 and HMMA 840.

B. Storage of Frames:
   1. Store frames in an upright position with heads uppermost under cover on 4" wood sills on floors in a manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters, which create a humidity chamber and promote rusting. Store assembled frames in a vertical position, five units maximum in a stack. Provide a 2" space between frames to permit air circulation.
   2. Store all hollow metal products in a manner to prevent exposure to adverse environmental elements and maintain the requirements of ANSI/SDI A250.10 and HMMA 840.
   3. Sand, touch up and clean prime painted surfaces prior to finish painting in accordance with the manufacturer’s instructions. Zinc base primer is to be used at all galvannealed doors and frames.

1.6 COORDINATION

A. Coordinate Work with other sections involving manufacture or fabrication of internal cutouts and reinforcement for door hardware and electrified items.

B. Coordinate hardware mounting heights as specified under Section 087100.

C. Coordinate door undercuts with architect’s details and specified hardware under Section 087100. Interior doors to be 3/8” undercut unless otherwise indicated.

D. Factory prep hollow metal frames to receive door contacts. Refer to security drawings for details, diagrams and locations.

E. The Contractor shall field verify existing door opening conditions where existing doors or frames are to remain or be replaced in part, for coordination with the specified hardware and notify the Architect of conflicts prior to proceeding. Failure to notify the Architect of conflicts that result in additional work or material is the responsibility of the Contractor, with no cost to the Owner.

F. Field dimensions need to be verified and approved prior to fabrication.

G. The supplier shall be responsible for proper coordination, templating, dimensions and all details required for doors, frames and hardware application.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Assa Abloy Ceco, Curries, or Fleming: www.assaabloydss.com.

B. Mesker, dormakaba Group: www.meskeropeningsgroup.com.

C. Metal Products, Inc.: www.metalproductsinc.com.

D. Republic Doors, an Allegion brand: www.republicdoor.com.

E. Steelcraft: www.steelcraft.com.

F. Pioneer Industries, an Assa Abloy company; www.pioneerindustries.com.

2.2 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:
   1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
   2. Recycled Content: Provide steel and aluminum with minimum 25 percent post-consumer recycled content.
   3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
   4. Door Edge Profile: Manufacturers standard for application indicated.
   5. Typical Door Face Sheets: Flush.
   6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
   7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
   8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
   9. Finish: Factory primed, for field finishing.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound or thermally-rated must comply with the requirements specified for exterior doors and for sound or thermally-rated doors; where two requirements conflict, comply with the most stringent.

2.3 HOLLOW METAL DOORS

A. Exterior Doors: Thermally insulated.
   1. Grade: ANSI/SDI A250.8 (SDI-100); Level 3 - Extra Heavy-Duty, Physical Performance Level A, Model 2 - Seamless.
   2. Core: Polyurethane.
   3. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
   4. Weatherstripping: Separate, see Section 08 71 00.
   5. Close to and bottom edges with galvanized, inverted steel channels; seal joints in top edges of doors against water penetration.

B. Interior Doors, Non-Fire-Rated:
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 3 - Extra Heavy-duty.
      b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 2 - Seamless.
      d. Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
   2. Door Thickness: 1-3/4 inch, nominal.

2.4 HOLLOW METAL FRAMES

A. General:
   1. Comply with the requirements of grade specified for corresponding door, except:
      a. ANSI/SDI A250.8 (SDI-100), Level 2 and 3 Door Frames: 14 gage, 0.067 inch, minimum thickness.
   2. Finish: Same as for door.
   3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
   4. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

B. Exterior Door Frames: Full profile welded, seamless.
   1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
   2. Weatherstripping: Separate, see Section 08 71 00.

C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.

D. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inch high to fill opening without cutting masonry units.

E. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

2.5 FRAME ANCHORS

A. Jamb Anchors:
   1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
   2. Post-installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:
   1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
   2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 ACCESSORIES

A. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is prohibited.

B. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

C. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

D. Ceiling Struts: Minimum 1/4 inch thick by 1 inch wide steel.

2.7 FINISH MATERIALS

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.1 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.2 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

C. Coordinate frame anchor placement with wall construction.

D. Install door silencers in frames before grouting.

E. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
   1. Hollow Metal Frames to receive grouting shall comply with ANSI/SDI Standard A250.8, paragraph 4.2.2., and HMMA 820 TN101, Grouting Hollow Metal Frames.
   2. Contractor to provide a metal mortar box at all hollow metal frames in masonry walls to receive electrical hardware and security components. Grout only the vertical jambs after mortar boxes and conduit are in place and field caulked. Do not grout frame heads.
   3. Provide and install temporary bottom and intermediate wood spreaders to maintain proper width and avoid bowing of jambs or deforming of frame members. Reference ANSI.A250.11.

F. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.

G. Install door hardware as specified in Section 08 71 00.

H. Coordinate installation of electrical connections to electrical hardware items.

I. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.

J. Touch up damaged factory finishes.

K. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:
    a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

3.3 TOLERANCES

A. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

B. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.

C. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.

D. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

3.4 ADJUSTING

A. Adjust for smooth and balanced door movement.

B. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

C. Remove grout and other bonding material from hollow metal work immediately after installation.

D. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

E. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

3.5 PROTECTION

A. Provide protective measures required throughout the construction period to ensure that door and frame units will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION

SECTION 08 33 23 - OVERHEAD COILING DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Overhead coiling doors, operating hardware, exterior; electrically operated; exterior mounted.

B. Wiring from electric circuit disconnect to operator to control station.

1.2 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.

D. ITS (DIR) - Directory of Listed Products; current edition.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

F. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000, with Errata (2008).

G. NEMA MG 1 - Motors and Generators; 2017.

H. UL (DIR) - Online Certifications Directory; Current Edition.

I. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.3 SUBMITTALS

A. Product Data: Provide general construction, electrical equipment, and component connections and details.

B. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.

1. For exterior components, include details of provisions for assembly expansion and contraction and for excluding and draining moisture to the exterior.

C. Manufacturer's Qualification Statement.

D. Installer's Qualification Statement.

E. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.

C. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for purpose specified.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Overhead Coiling Doors:
   1. Cornell Iron Works, Inc.; Product ESD20 (Basis-of-Design).
   2. The Cookson Company.
   3. Clopay Building Products.
   4. Overhead Door Company.

2.2 COILING DOORS

A. Exterior Coiling Doors: Steel slat curtain.
   1. Capable of withstanding positive and negative wind loads of 20 psf, without undue deflection or damage to components.
   2. Operation Cycles: Door components and operators capable of operating for not less than 20,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
   3. Air Infiltration: Maximum rate of 1.0 cfm/sq. ft. (5.1 L/s per sq. m) at 15 and 25 mph when tested according to ASTM E 283 or DASMA 105.
   4. Sandwich slat construction with insulated core of foamed-in-place polyurethane insulation; minimum R-value of 8.
   5. Bottom Bar: Two angles with powder coat finish; standard of manufacturer.
   6. Finish: Galvanized and powder coat.
   7. Guide, Angles: Galvanized steel.
   8. Hood Enclosure: Galvanized steel; powder coat finish.
   9. Electric operation.
   10. Mounting: Surface mounted.

2.3 MATERIALS AND COMPONENTS

A. Curtain Construction: Interlocking slats.
   1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
   2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
   3. Weatherstripping: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.

B. Steel Slats: Minimum thickness 22 gage (exterior side) and 22 gage (interior side); ASTM A653/A653M galvanized steel sheet.
   1. Galvanizing: Minimum G90 coating.
   2. Size: Approximately 3 inches exposed face; nom. 1 inch thickness.

C. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 0 and 10, respectively, according to ASTM E 84 or UL 723. Insulation to be CFC free. Enclose insulation completely within slat faces.

D. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.

E. Guides - Angle: ASTM A36/A36M metal angles, size as indicated.
   1. Hot-dip galvanized in compliance with ASTM A123/A123M.

F. Hood Enclosure and Trim: Internally reinforced to maintain rigidity and shape.

1. Exterior-Mounted Doors: Fabricate hood to act as weather protection and with a perimeter sealant-joint-bead profile for applying joint sealant.
2. Galvanized minimum 24 gage steel; powder coat finish.

G. Lock Hardware: Cylinder lock for electric operation with interlock switch

H. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

I. Weatherseals for Exterior Doors: Equip each exterior door with weather-stripping gaskets fitted to entire exterior perimeter of door for a weather-resistant installation unless otherwise indicated.

2.4 FINISH

A. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.

B. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.5 ELECTRIC OPERATION

A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
1. Provide interlock switches on motor operated units.

B. Electric Operators:
1. Mounting: Side mounted.
2. Motor Enclosure:
a. Exterior Coiling Doors: NEMA MG 1, Type 4; open drip proof.
3. Motor Rating: Minimum 3/4 hp; continuous duty.
4. Use Classification: Standard duty, up to 25 cycles per hour and up to 90 cycles per day.
5. Motor Voltage: 120 volts, single phase.
6. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
7. Controller Enclosure: NEMA 250, Type 1.
8. Opening Speed: 12 inches per second.
9. Brake: Adjustable friction clutch type, activated by motor controller.
10. Manual override in case of power failure; chain type.

C. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator conforming to UL 325.
1. 24 volt circuit.
2. Surface mounted, at interior door jamb.
3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms conforming to UL 325.
a. Primary Device: Provide electric sensing edge as required with momentary-contact control device.

D. Safety Edge: Located at bottom of coiling door, full width, electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object, hollow neoprene covered.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that opening sizes, tolerances and conditions are acceptable.

3.2 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of electrical service with Section 26 05 83.

F. Complete wiring from disconnect to unit components.

G. Install enclosure and perimeter trim.

3.3 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.

B. Maximum Variation From Plumb: 1/16 inch.

C. Maximum Variation From Level: 1/16 inch.

D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.4 ADJUSTING

A. Adjust operating assemblies for smooth and noiseless operation.

B. Adjust exterior doors and components to be weather resistant; adjust seals to provide tight fit around entire perimeter.

C. Lubricate bearings and sliding parts as recommended by manufacturer.

3.5 CLEANING

A. Clean installed components.

B. Remove labels and visible markings.

3.6 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of coiling-door Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

B. Perform maintenance, including emergency callback service, during normal working hours.

C. Include 24-hour-per-day, seven-day-per-week, emergency callback service.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION

SECTION 09 21 16 - GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.

B. Gypsum wallboard.

C. Glass mat faced gypsum board.

D. Moisture and mold resistant wallboard.

E. Impact-resistant gypsum board.

F. Wall base backer board.

G. Joint treatment and accessories.

1.2 REFERENCE STANDARDS

A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.

B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

C. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.

D. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.

E. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014a.

F. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2015.

G. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.

H. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

I. ASTM E413 - Classification for Rating Sound Insulation; 2016.

J. GA-216 - Application and Finishing of Gypsum Board; 2013.

1.3 SUBMITTALS

A. Product Data: Provide data on gypsum board, glass mat faced gypsum board, accessories, and joint finishing system.

B. Submit drawings indicating proposed location of control joints for Architect's review; locations to be approved by Architect and may be adjusted for aesthetic reasons.

1.4 QUALITY ASSURANCE

A. Maintain one copy of all installation standards at project site.

B. Perform in accordance with ASTM C 840.
   1. Maintain one copy of standards at project site.

PART 2 PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

2.2 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. CertainTeed Corporation: www.certainteed.com.
   2. Continental Building Products: www.continental-bp.com.
   3. Georgia-Pacific Gypsum: www.gpgypsum.com.
   4. Lafarge North America: www.lafarge.com.
   5. National Gypsum Company: www.nationalgypsum.com.
   6. USG Corporation: www.usg.com.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Regular Type:
      a. Application: Use for vertical surfaces, unless otherwise indicated.
      b. Edges: Tapered.
      c. Recycled Content: Provide regular type gypsum panel products with minimum 80 percent recycled content, including recycled content face paper; provide Type X with minimum 10 percent recycled content.
   2. Ceiling Board: Special sag-resistant type.
      a. Application: Ceilings, except areas with showers or otherwise indicated.
      b. Thickness: 1/2 inch.
      c. Edges: Tapered.

C. Impact Resistant Wallboard:
   1. Application: Where Drawings indicate impact- or abuse-resistant gypsum wallboard.
   2. Surface Abrasion: 2, minimum, when tested in accordance with ASTM C1629/C1629M.
   3. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
   4. Soft Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
   5. Hard Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
   6. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   7. Thickness: 5/8 inch.
   8. Edges: Tapered.
   9. Products:
      a. Continental Building Products; Protecta HIR 300 Type X with Mold Defense.
      b. Georgia-Pacific Gypsum; DensArmor Plus Impact-Resistant.
      c. National Gypsum Company; Gold Bond HI-Impact XP Gypsum Board.
      d. National Gypsum Company; Gold Bond eXP Interior Extreme IR Gypsum Panel.

D. Moisture and Mold Resistant Wallboard: Wallboard installed at building perimeter, and any wallboard furred to concrete or masonry construction.
   1. Characteristics:
      a. Edges: Tapered.
      b. Resists the growth of mold when tested, as manufactured, according to ASTM D 3273.
   2. Available Products:
      a. SHEETROCK® Brand Mold Tough® Gypsum Panels by USG.

b. Gold Bond® BRAND XP® Wallboard by National Gypsum.
c. Mold Defense Products by LaFarge.

E. Wall Base Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 5/8 inch thick; 2 inch wide coated glass fiber tape for joints and corners.
1. Product: Durock Brand Cement Board manufactured by United States Gypsum Company.
a. Contractor Option: PermaBase Brand Cement Board, by National Gypsum Company.
2. Location: Base of all walls (new and existing) to receive resilient wall base; 3-inches above finished floor.

2.3 FIBERGLASS REINFORCED BOARD MATERIALS

A. Glass Mat Gypsum Board: Gypsum panels with moisture-resistant core and coated inorganic fiberglass mat back surface designed to resist growth of mold and mildew, per ASTM D 3273.
1. Glass Mat Board: Comply with performance requirements of ASTM C 1396/C 1396M for water-resistant gypsum backing board; tapered long edges.
2. Application: High-humidity or wet locations; walls or ceilings; high-humidity or wet locations include areas with janitor basins, toilets, mechanical penthouses and mechanical spaces with steam, hot water or condensation generating equipment.
a. Available Products:
1) DensArmor Plus Interior Guard by G-P Gypsum.
2) EXP Extreme by National Gypsum.

2.4 ACCESSORIES

A. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
1. Types: As detailed or required for finished appearance.
2. Available products include the following:
a. Grabber Construction Products: No-Coat Prefinished Corners.
b. US Gypsum Company; Beadex Paper-Faced Metal Drywall Bead and Trim.

B. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
1. Ready-mixed vinyl-based joint compound.

C. High Build Drywall Surfacer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.

D. Screws: ASTM C 1002; self-piercing tapping type.

E. Adhesives Applied within the Building Waterproofing Envelope: Comply with low-emitting requirements.

F. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
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. Fry Reglet Corp.
b. Gordon, Inc.
c. Pittcon Industries.
2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
3. Finish:
a. Corrosion-resistant primer compatible with joint compound and finish materials specified.

b. Silicone polyester enamel finish coat; custom color to be selected.

4. Reveals, Trims and Molding: As indicated on Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.2 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
   1. Exception: Tapered edges to receive joint treatment at right angles to framing.

C. Double-Layer Non-Rated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Use glass mat faced gypsum board at exterior walls and at other locations as indicated. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.

E. Install cementitious panel for first 3 inches above floor, at base of wall, to receive resilient wall base.

F. Glass Mat Faced Gypsum Board: Install in strict accordance with manufacturer's instructions.

G. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.

H. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.

3.3 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
   1. Not more than 30 feet apart on walls and ceilings over 50 feet long.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.4 JOINT TREATMENT

A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.

B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   2. Level 5: Walls and ceilings to receive Decorative Semi-Rigid Wall Covering, semi-gloss or gloss paint finish and other areas specifically indicated.
   3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
   4. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.
   5. Level 0: Temporary partitions.

C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.

D. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.5 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Metal partition, ceiling, and soffit framing.

B. Framing accessories.

1.2 REFERENCE STANDARDS

A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.

B. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.

D. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.

E. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

F. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.

G. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.

H. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.3 SUBMITTALS

A. Shop Drawings:
   1. Indicate prefabricated work, component details, stud layout, framed openings, anchorage to structure, acoustic details, type and location of fasteners, accessories, and items of other related work.
   2. Describe method for securing studs to tracks, splicing, and for blocking and reinforcement of framing connections.

B. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, limitations, and head to structure connectors, showing compliance with requirements.

C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.4 PROJECT CONDITIONS

A. Coordinate the placement of components to be installed within stud framing system.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Metal Framing, Connectors, and Accessories:
   1. Clarkwestern Dietrich Building Systems LLC: www.clarkdeitrich.com.
   2. Dietrich Metal Framing: www.dietrichindustries.com.

3. Marino: www.marinoware.com.

B. Slip-Type Head Joints:
1. Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series.
2. Superior Metal Trim; Superior Flex Track System (SFT).
3. Dietrich Metal Framing; Fast Top Clip.

C. Metal Back-up Plates:
1. Metal Lite, Inc., Anaheim, CA.

D. Grid Suspension System for Gypsum Board Ceilings and Bulkheads:
1. Armstrong World Industries, Inc.; Drywall Grid Systems.
2. Chicago Metallic Corporation; Drywall Furring System.
3. USG Corporation; Drywall Suspension System.

2.2 FRAMING MATERIALS

A. Recycled Content: Provide steel with at least 25 percent post-consumer recycled content.

B. Regional Materials: Provide at least 25 percent of steel manufactured and containing recycled raw materials recovered within 100 mile radius of Project Site.

C. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
1. Studs: C shaped with flat or formed webs with knurled faces.
a. Typical: Minimum 0.0283 inch, 22 gage (27 mil) except when reference standard states a more stringent requirement.
b. At door and glazed opening jambs, and framing supporting ceramic tile: Minimum 0.0312 inch, 20 gage (30 mil) except when reference standard states a more stringent requirement.
c. Note: The Architect will accept "Effective Thickness" listed UltraSTEEL Framing, with independent test data.
2. Runners: U shaped, sized to match studs.
3. Ceiling Channels: C shaped.
4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.

D. Loadbearing Studs: As specified in Section 05 40 00.

E. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

F. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
2. Material: ASTM A653/A653M steel sheet, SS Grade 50, with G60/Z180 hot dipped galvanized coating.
3. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 12 feet.

G. Tracks and Runners: Same material and thickness as studs, bent leg retainer notched to receive studs with provision for crimp locking to stud.

H. Furring and Bracing Members: Of same material as studs; thickness to suit purpose; complying with applicable requirements of ASTM C754.

I. Fasteners: ASTM C1002 self-piercing tapping screws.

J. Sheet Metal Backing: 0.036 inch thick, galvanized.

K. Anchorage Devices: Power actuated.

L. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced.

M. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.
   1. Comply with low-emitting requirements specified in Section 01 81 13.

N. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic.

2.3 FABRICATION

A. Fabricate assemblies of framed sections to sizes and profiles required.

B. Fit, reinforce, and brace framing members to suit design requirements.

PART 3 EXECUTION

3.1 INSTALLATION OF STUD FRAMING

A. Comply with requirements of ASTM C754.

B. Extend partition framing to structure where indicated and to ceiling in other locations.

C. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.

D. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

E. Align and secure top and bottom runners at 24 inches on center.

F. Place one bead of acoustic sealant between runners and substrate, studs and adjacent construction.

G. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.

H. Install studs vertically at spacing indicated on drawings.

I. Align stud web openings horizontally.

J. Secure studs to tracks using crimping method. Do not weld.

K. Stud splicing is not permissible.

L. Fabricate corners using a minimum of three studs.

M. Double stud at wall openings, door and window jambs, not more than 2 inches from each side of openings.

N. Coordinate erection of studs with requirements of door frames; install supports and attachments.

O. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.

P. Furring: Install at spacing and locations shown on drawings. Lap splices a minimum of 6 inches.

Q. Provide metal backup plates as required to accommodate the wall hung casework, millwork, railings or other items mounted to metal stud and wallboard walls and partitions; provide plates up to 8 feet in length as one-piece units.

3.2 CEILING AND SOFFIT FRAMING

A. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.

B. Install furring independent of walls, columns, and above-ceiling work.

C. Securely anchor hangers to structural members or embed in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.

D. Space main carrying channels at maximum 72 inch on center, and not more than 6 inches from wall surfaces. Lap splice securely.

E. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.

F. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.

G. Reinforce openings in suspension system that interrupt main carrying channels or furring channels with lateral channel bracing. Extend bracing minimum 24 inches past each opening.

H. Laterally brace suspension system.

I. Contractor Option - Grid Suspension System for Gypsum Board Ceilings and Bulkheads: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

3.3 TOLERANCES

A. Maximum Variation From True Position: 1/8 inch in 10 feet.

B. Maximum Variation From Plumb: 1/8 inch in 10 feet.

END OF SECTION

SECTION 09 30 00 - TILING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Cementitious backer board as tile substrate.

D. Stone thresholds.

G. Trims.

H. Waterproofing and crack isolation membrane.

1.2 REFERENCE STANDARDS

A. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2017.

B. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2013.1.

1. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2014.
2. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
3. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement; 1999 (Reaffirmed 2010).
4. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2009 (Revised).
5. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
6. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 1999 (Reaffirmed 2010).
7. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2010).
8. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (Reaffirmed 2010).
9. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 1999 (Reaffirmed 2010).
10. ANSI A108.11-SystemDeleted - American National Standard for Interior Installation of Cementitious Backer Units; 2010 (Revised).
11. ANSI A108.12 - American National Standard for Installation of Ceramic Tile with EGP (Exterior glue plywood) Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).

12. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2010).
13. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2012 (Revised).
14. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2010 (Revised).
15. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2016).
16. ANSI A118.9-SystemDeleted - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2010).
17. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2013.1.
18. ASTM C373 - Standard Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products, Ceramic Tiles, and Glass Tiles; 2014a.

C. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2015.

1.3 SUBMITTALS

A. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

B. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.

C. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches in size illustrating pattern, color variations, and grout joint size variations.

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

E. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

1.4 QUALITY ASSURANCE

A. Maintain one copy of ANSI A108/A118/A136 and TCNA (HB) on site.

1.5 PRE-INSTALLATION MEETING

A. Convene one week before starting work of this section.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.7 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

1.8 EXTRA MATERIALS

A. Extra Tile: 2 percent of each size, color, and surface finish combination, but not less than one box of each type.

B. Turn over any cut tile exceeding 50 percent of a full tile, as extra materials.

PART 2 PRODUCTS

2.1 TILE

A. Porcelain Tile: ANSI A137.1, standard grade.
   1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
   2. Edges: Cushioned.
   3. Surface Finish: Unglazed.
   4. Color(s): To be selected by Architect from manufacturer's standard range.
   5. Trim Units: Matching cove base and cove shapes in sizes coordinated with field tile.
   6. Products:
      a. PT-1:
         1) Basis-of-Design: Daltile, Reminiscent.
         2) Location: Floors.
         3) Color: RM23 Reclaimed Gray.
         4) Size: 12 by 12 inches.
         5) Thickness: 5/16 inch.
         6) 3/16 inch grout joint width.
      b. PT-2:
         1) Basis-of-Design: Daltile, Reminscent.
         2) Location: Walls.
         3) Color: To be determined.
         4) Size: 12 x 24 inches.
         5) Thickness: 3/8 inch.
         6) 1/8 inch grout joint width.

2.2 TRIM AND ACCESSORIES

A. Ceramic Trim: Matching cove base and cove ceramic shapes in sizes coordinated with field tile where indicated on the drawings.
   1. Applications:
      a. Open Edges: Bullnose.
      b. Inside Corners: Jointed.
      c. Floor to Wall Joints: Cove base.
   2. Manufacturers: Same as for tile.

B. Thresholds: Marble, gray, honed finish; 5 inches wide by full width of wall or frame opening; 1/2 inch thick; beveled one long edge with radiused corners on top side; without holes, cracks, or open seams.
   1. Applications:
      a. At doorways where tile terminates, unless indicated otherwise.
      b. At open edge of shower stalls using cermic mosaic tile as basin.

2.3 SETTING MATERIALS

A. Latex-Portland Cement Mortar Bond Coat - Thin Set and Medium Bed: ANSI A118.4.
   1. Products:
      a. ARDEX Engineered Cements: www.ardexamericas.com
      b. Custom Building Products: www.custombuildingproducts.com.
      c. Bonsal American, Inc: www.sakrete.com.
      d. Bostik Inc: www.bostik-us.com..
      e. MAPEI Corporation.
      f. TEC Specialty Products, Inc.

2. Medium Bed Locations: Where required to produce slope; product that is approved by manufacturer for application thickness of 5/8 inch (16 mm).

2.4 GROUTS

A. Manufacturers:
1. ARDEX Engineered Cements: www.ardexamericas.com.
2. Bonsal American, Inc: www.sakrete.com
3. Bostik Inc: www.bostik-us.com/#sle.
4. Custom Building Products: www.custombuildingproducts.com/#sle.
5. LATICRETE International, Inc: www.laticrete.com/#sle.
6. TEC, an H.B. Fuller Construction Products Brand: www.tecspecialty.com/#sle.
7. Custom Building Products: www.custombuildingproducts.com.
8. MAPEI Corporation.

B. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
3. Colors: As selected by Architect from manufacturer's full line.

2.5 ACCESSORY MATERIALS

A. Waterproofing and Crack Isolation Membrane: Fluid-applied acrylic-based membrane with reinforcing mesh, complying with ANSI A118.10.
1. Basis-of-Design: Mapei Corporation; Mapelastic HPG with Fiberglass Mesh.
2. Equivalent product of listed setting and grouting material manufacturers.
3. Location: All tile floors; full coverage.

B. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.
1. Product: Durock Brand Cement Board manufactured by United States Gypsum Company.
a. Contractor Option: PermaBase Brand Cement Board, by National Gypsum Company.
2. Location: Wet walls and high-humidity areas (not required at corridor locations).

D. Metal Edge Strips:
1. Use metal trims at all tile edges.
2. At Shower Entries:
a. Description: two-part splashguard profile with a 3/4" (19 mm) wide anodized aluminum support section and PVC insert that together form the visible surface between the tiled floors and walls.
b. Splashguard Insert:
1) Collapsible Straight Lip
c. Basis-of-Design: Schluter SHOWERPROFILE-WS.
3. At wall tile edging and outside corners:
a. Description: Profile with a 1/8” (3.5 mm) reveal for outside corners of tiled walls, and 135 Degree integrated trapezoid-perforated anchoring leg.
b. Corners:
1) Provide with matching outside corners
c. Material and Finish:
1) E - Stainless Steel Type 304 = V2A
d. Basis-of-Design: Schluter FINEC.

4. Open Edge of Tile with Adjacent Finish of Similar Height:
   a. General: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications, stainless steel; ASTM A 666, 300 Series exposed-edge material.
   b. Basis-of-Design: 1.1 Schluter-SCHIENE Edge-protecting Profile; stainless steel.
5. Open Edge of Tile with Adjacent Finish of Different Height:
   a. General: ADA-compliant profile, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications, stainless steel; ASTM A 666, 300 Series exposed-edge material.
   b. Basis-of-Design:
      1) 1.2 Schluter-RENO-U Reducer Profile, where tile surface is higher than adjacent finish; stainless steel.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.

D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.

E. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install cementitious backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of dry-set mortar to a feather edge.

3.3 INSTALLATION - GENERAL

A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.13, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Install thresholds where indicated.

G. Sound tile after setting. Replace hollow sounding units.

H. Keep control and expansion joints free of mortar, grout, and adhesive.

I. Keep expansion joints free of adhesive or grout. Apply sealant to joints.

J. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

K. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

L. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

M. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.4 INSTALLATION - FLOORS - THIN-SET AND MEDIUM BED METHODS

A. Provide specified waterproofing and crack isolation membrane for all tile floor areas; install in accordance with TCA Method F122, with latex-portland cement grout.

3.5 INSTALLATION - WALL TILE

A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at toilet rooms.

B. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.6 CLEANING

A. Clean tile and grout surfaces.

3.7 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

B. Cover products installed on horizontal surfaces with undyed, untreated building paper until Substantial Completion.

C. Do not move heavy and sharp objects directly over surfaces. Place hardboard or plywood panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION

SECTION 09 65 13 - RESILIENT BASE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Resilient base.

B. Installation accessories.

1.2 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

B. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

C. Verification Samples: Submit two samples, illustrating color for each resilient flooring product specified.

1.3 FIELD CONDITIONS

A. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.1 RESILIENT BASE

A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
   1. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
   2. Height: 4 inch.
   3. Thickness: 0.125 inch thick.
   4. Finish: Satin.
   5. Length: Roll.
   6. Color: Color as selected from manufacturer's standards.
   7. Manufacturers:
      a. Burke Flooring: www.burkemercer.com.
      b. Johnsonite, a Tarkett Company: www.johnsonite.com.
      c. Roppe Corp: www.roppe.com.
      d. Nora Systems, Inc.: www.nora.com.
      e. NPlus: www.nplusrubber.com

2.4 ACCESSORIES

A. Adhesive: Recommended by manufacturer and compliant with California Department of Public Health (CDPH) Standard Method v1.1-2010.

PART 3 EXECUTION

3.1 RESILIENT BASE INSTALLATION

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, 'V' cut back of base strip to 2/3 of its thickness and fold. At exposed ends, use premolded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

END OF SECTION

SECTION 09 91 23 - INTERIOR PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section includes surface preparation and the application of paint systems on the following interior substrates:
   1. Concrete.
   2. Concrete masonry units (CMU).
   3. Steel.
   4. Galvanized metal.
   5. Wood.
   6. Gypsum board.
   7. Wood fiber acoustical panels.
   8. Cotton or canvas insulation coverings.
   9. Exposed PVC piping.

1.2 DEFINITIONS

A. Gloss Ranges:
   1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
   2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
   3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
   4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.3 REFERENCE STANDARDS

A. ASTM D 3359 - Standard Test Methods for Mearsuring Adhesion by Tape.

B. SSPC (PM1) - Good Painting Practice: SSPC Painting Manual, Vol. 1; Society for Protective Coatings.

1.4 SUBMITTALS

A. Product Data: Provide data for each type of product submitted.

B. Samples for Initial Selection: Submit each type of topcoat product indicated.

C. Samples for Verification: Submit each type of paint system and each color and gloss of topcoat indicated.
   1. Submit Samples on rigid backing, minimum 8 inches square.
   2. Step coats on Samples to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

D. Product List: Submit each product indicated, include the following:
   1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

E. Maintenance Materials: Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
   1. Quantity: Furnish an additional 5 percent, but not less than 2 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

1.6 MOCK-UP

A. Benchmark Samples (Mock-ups): Provide benchmark finish sample (all coats) for each coating type and substrate.
   1. Architect will select several rooms or surfaces to represent surfaces and conditions, for application of each paint system type and substrate; colors will be provided for Benchmark Samples.
      a. Wall Surfaces: Complete minimum 100 square feet.
      b. Small Areas and Items: Apply systems to items designated by the Architect.
   2. Complete Benchmark Samples per the requirements of this Section.
      a. Provide required sheen, color and texture for each surface.
      b. Architect-accepted Benchmark Samples to establish level of quality for remainder of Work.
   3. Architect to provide final color approvals from Benchmark Samples and intermediate coat wall colors; refer to subsection 3.3 of this Section.
   4. Benchmark samples to be prepared by individuals performing the remaining Work for this Project.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F and a maximum 90 deg F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Benjamin Moore & Co.

B. Behr Process Corporation.

C. PPG Paints.

D. Sherwin-Williams Company.

E. McCormick Paints.

2.2 PAINT, GENERAL

A. Material Compatibility:
   1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors:
   1. As selected by Architect from manufacturer's full range.
   2. Different colors may be used in the same room.
   3. Colors of frames may be different than doors.
   4. Colors for ceilings and trim may be different from walls, and walls may be more than one color or striped.
   5. Dark tints may be used on metal frames that may require more coats than that indicated on paint schedule for proper coverage; apply as many coats as necessary for complete hide.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Concrete: 12 percent.
   2. Masonry (CMU): 12 percent.
   3. Wood: 15 percent.
   4. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
   1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. Use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
   2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

C. Seal surfaces that might cause bleed through or staining of topcoat.

D. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

E. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

F. Insulated Coverings to be Painted: Remove dirt, grease, and oil from canvas and cotton.

G. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

H. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

I. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

J. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

K. Passivated Galvanized Steel: Clean with a water-based industrial strength cleaner, and/or “Brush Blast” in accordance with SSPC-SP7. After the surface has been prepared, apply recommended primer to a small area. Allow primer to cure for 7 days, and test adhesion using the “cross-hatch adhesion tape test” method in accordance with ASTM D 3359. If the adhesion of the primer is positive, proceed with a recommended coating system for galvanized metal.

L. Wood Substrates:
1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

M. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

N. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 COLOR COORDINATION

A. Tint intermediate coats for wall surfaces to match color sample selections.

B. Architect will visit the Project within 7 days after notification, to review primed walls for final color coordination.

C. Allow 3 week days in schedule for Architect to change final wall colors between intermediate coat and remaining coat(s).

D. Allow time to order final paint colors; do not order final paint colors until obtaining final color approvals.

3.4 APPLICATION

A. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
   1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
   2. Wall Surfaces: Receive final color approvals following Architect's review of Intermediate Coats, before proceeding.
   3. Omit primer over metal surfaces that have been shop primed and touchup painted.
   4. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
   5. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

B. Apply paints according to manufacturer's written instructions.
   1. Use applicators and techniques suited for paint and substrate indicated.
   2. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
      a. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
   3. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   4. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
   5. Finish doors on tops, bottoms, and side edges the same as faces.

C. Block Fillers:
   1. Apply two coats of block filler to concrete masonry block at a rate to ensure complete coverage with pores filled.
   2. Perform a squeegee operation on second coat to fill all crevices and produce a smooth surface; do not remove filler material from surface with the squeegee operation.

D. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
   1. Wall Surfaces: Tint Prime Coat a lighter shade to facilitate identification; tint Prime Coat to match color of finish coat, but provide sufficient difference in shade to distinguish Prime Coat from Intermediate Coat used for final color selections.

2. Other Surfaces: Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

E. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

F. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

G. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

H. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:
   1. Mechanical Work:
      a. Uninsulated metal piping.
      b. Uninsulated plastic piping.
      c. Pipe hangers and supports.
      d. Tanks that do not have factory-applied final finishes.
      e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
      f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
      g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
   2. Electrical Work:
      a. Switchgear.
      b. Panelboards.
      c. Electrical equipment that is indicated to have a factory-primed finish for field painting.
      d. Exposed wiremold and conduit in all finished spaces to match color of wall.

I. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
   1. Prefinished items include the following factory-finished components:
      a. Architectural woodwork.
      b. Metal toilet enclosures.
      c. Metal lockers.
      d. Finished mechanical and electrical equipment.
      e. Light fixtures.
   2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
      a. Foundation spaces.
      b. Furred areas.
      c. Ceiling plenums.
      d. Utility tunnels.
      e. Pipe spaces.
      f. Duct shafts.

3. Finished metal surfaces include the following:
    a. Anodized aluminum.
    b. Stainless steel.
    c. Chromium plate.
    d. Copper and copper alloys.
    e. Bronze and brass.
4. Operating parts include moving parts of operating equipment and the following:
    a. Valve and damper operators.
    b. Linkages.
    c. Sensing devices.
    d. Motor and fan shafts.
5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
6. Items indicated to receive other finishes.
7. Items indicated to remain unfinished.
8. Floors, unless specifically so indicated.
9. Ceramic and other tiles.
10. Acoustical materials, unless specifically so indicated.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINT SCHEDULE

A. Concrete and Masonry Other Than Concrete Masonry Units:
    1. Semi-Gloss Sheen:
        a. Benjamin Moore & Co.:
            1) Primer (Unpainted Surfaces): Ultra Spec Masonry Int/Ext Acrylic Sealer (608).
            2) First and Second Coats: Ultra Spec 500 Waterborne Zero VOC Semi-Gloss N539.
        b. Behr Process Corporation:
            1) Primer: Premium Plus Interior All-In-One Primer & Sealer, 75
            2) First and Second Coats: Behr Pro i300 Interior Semi-Gloss Paint, 370
        c. PPG Paints:
            1) Primer (Unpainted Surfaces): Speedhide Zero Int. Latex Quick Drying Primer/Sealer, 6-4900XI.
            2) First and Second Coats: Speedhide Zero Interior Flat Latex, 6-4510XI.
        d. Sherwin-Williams Company:
            1) Primer (Unpainted Surfaces): Loxon Concrete and Masonry Primer LX02 Series.
            2) First and Second Coats: ProMar 200 Zero VOC Interior Latex Semi-Gloss, B31-2650 Series.

e. McCormick Paints:
1) Primer (Unpainted Surfaces): Acrylok Interior/Exterior 100% Acrylic Masonry Primer 06451.
2) First and Second Coats: McCormick Total Advantage Zero VOC Professional Coating Semi-Gloss 10 Series .

B. Concrete Masonry Units:
1. Semi-Gloss Sheen:
a. Benjamin Moore & Co.:
1) Block Filler (Unpainted Surfaces): Ultra Spec Hi-Build Masonry Block Filler (571).
2) First and Second Coats: Ultra Spec 500 Waterborne Interior Semi-Gloss N539.
b. Behr Process Corporation:
1) Block Filler (Unfinished Surfaces): Behr Pro Block Filler Primer, 50
2) First and Second Coats: Behr Pro i300 Interior Semi-Gloss Paint, 370
c. PPG Architectural Coatings; Glidden Professional:
1) Block Filler (Unpainted Surfaces): Concrete Coatings Interior/Exterior Block Filler 3010.
2) First and Second Coats: Ultra-Hide No VOC Semi-Gloss Paint 1415.
d. PPG Architectural Coatings; PPG Paints:
1) Block Filler (Unpainted Surfaces): Speedhide Latex Block Filler 6-15XI.
2) First and Second Coats: Speedhide Zero Interior Semi-Gloss Latex Enamel, 6-4510XI Series.
e. Sherwin-Williams Company:
1) Block Filler (Unpainted Surfaces): PrepRite Latex Block Filler B25W25.
2) First and Second Coats: ProMar 200 Zero VOC Interior Latex S/G, B31-2650 Series.
f. McCormick Paints:
1) Block Filler (Unpainted Surfaces): McCormick Interior/Exterior Latex Block Filler 01015.
2) First and Second Coats: McCormick Total Advantage Zero VOC Professional Coating Semi-Gloss 10 Series.

C. Gypsum Board:
1. Flat Sheen: Ceilings.
a. Benjamin Moore & Co.:
1) Primer (Unpainted Surfaces): Ultra Spec 500 Waterborne Zero VOC Primer Sealer N534.
2) First and Second Coats: Ultra Spec 500 Waterborne Zero VOC Flat N536.
b. Behr Process Corporation:
1) Primer (Unpainted Surfaces) Interior Drywall Primer & Sealer, 73
2) First and Second Coats: Behr Pro i300 Interior Flat Paint, 310
c. PPG Paints:
1) Primer (Unpainted Surfaces): Speedhide Zero Int. Latex Quick Drying Primer/Sealer, 6-4900XI.
2) First and Second Coats: Speedhide Zero Interior Flat Latex l, 6-4110XISeries.
d. Sherwin-Williams Company:
1) Primer (Unpainted Surfaces): ProMar 200 Zero VOC Interior Latex Primer, B28W2600.
2) First and Second Coats: ProMar 200 Zero VOC Interior Latex Flat, B30-2650 Series.

e. McCormick Paints:
1) Primer (Unpainted Surfaces): McCormick 1st Step Interior Vinyl Primer Sealer 06431.
2) First and Second Coats: McCormick Total Advantage Zero VOC Professional Coating Flat 08 Series.

2. Low-Luster, Satin or Eggshell Sheen:
a. Benjamin Moore & Co.:
1) Primer (Unfinished Surfaces): Ultra Spec 500 Waterborne Interior Primer Sealer N534.
2) First and Second Coats: Ultra Spec 500 Waterborne Zero VOC Eggshell Enamel N538.
b. Behr Process Corporation:
1) Primer (Unpainted Surfaces) Interior Drywall Primer & Sealer, 73
2) First and Second Coats: Behr Pro i300 Interior Eggshell Paint, 330
c. PPG Paints:
1) Primer (Unfinished Surfaces): Speedhide Zero Latex Quick Drying Primer/Sealer, 6-4900XI.
2) First and Second Coats: Speedhide Zero Interior Eggshell Latex 6-4310XI Series.
d. Sherwin-Williams Company:
1) Primer (Unfinished Surfaces): ProMar 200 Zero VOC Interior Latex Primer, B28W2600.
2) First and Second Coats: ProMar 200 Zero VOC Interior Latex Eg-Shel, B20-2650 Series.
e. McCormick Paints:
1) Primer (Unpainted Surfaces): McCormick 1st Step Interior Vinyl Primer Sealer 06431.
2) First and Second Coats: McCormick Total Advantage Zero VOC Professional Coating Eggshell 09 Series.

D. Woodwork and Hardboard - Painted:
1. Semi-Gloss Sheen:
a. Benjamin Moore & Co.:
1) Undercoat (Unfinished Surfaces): Fresh Start 100% Acrylic Superior Primer 023.
2) First and Second Coats: Ultra Spec 500 Waterborne Interior Zero VOC Semi-Gloss 539.
b. Behr Process Corporation:
1) Primer (Unpainted Surfaces) Interior All-In-One Primer & Sealer, 75
2) First and Second Coats: Behr Pro i300 Interior Semi-Gloss Paint, 370
c. PPG Architectural Coatings; PPG Paints:
1) Undercoat (Unfinished Surfaces): 17-921 Seal Grip Interior/Exterior Acrylic Universal Primer
2) First and Second Coats: Speedhide Zero Interior Semi-Gloss Latex Enamel, 6-4510XI Series.
d. Sherwin-Williams Company:
1) Undercoat (Unfinished Surfaces): Multi-Purpose Waterbased Acrylic-Alkyd Primer B79-450.
2) First and Second Coats: ProMar 200 Zero VOC Interior Latex S/G, B31-2600 Series; or Pro Industrial Acrylic Coating S/G B66-650 (Doors & Frames).

e. McCormick Paints:
1) Undercoat (Unpainted Surfaces): McCormick 1st Step Interior Latex Enamel Undercoater and Primer Sealer 06441.
2) First and Second Coats: McCormick Total Advantage Zero VOC Professional Coating Semi-Gloss 10 Series.

E. Mechanical and Electrical Items: Use 3-coat system best suited to substrate, satin finish. Use heat resistant materials where required.

F. Ferrous Metal:
1. Semi-Gloss Sheen:
a. Benjamin Moore & Co.:
1) Primer (Unfinished Surfaces): Ultra Spec HP Acrylic Metal Primer HP04.
2) First and Second Coats: Ultra Spec 500 Waterborne Interior Semi-Gloss 539.
b. Behr Process Corporation:
1) Primer (Unfinished Surfaces): Premium Plus Multi-Surface Primer, 436
2) First and Second Coats: Behr Pro i300 Interior Semi-Gloss Paint, 370
c. PPG Paints:
1) Primer (Unfinished Surfaces): Pitt Tech Plus 4020 PF
2) First and Second Coats: Speedhide Zero Interior Semi-Gloss Latex Enamel, 6-4510XI Series.
d. Sherwin-Williams Company:
1) Primer (Unfinished Surfaces): Pro-Cryl Universal Primer, B66-1310 Series.
2) First and Second Coats: ProMar 200 Latex Gloss, B11-2200 Series; or Pro Industrial Acrylic Coating S/G, B66-650 (Doors & Frames).
e. McCormick Paints:
1) Primer (Unfinished Surfaces): Corotech Acrylic Metal Primer V110.
2) First and Second Coats: McCormick Interlok Interior/Exterior Acrylic Semi-Gloss Urethane DTM 45 Series or comparable product.

G. Zinc-Coated (Galvanized) Metal:
1. Semi-Gloss Sheen:
a. Benjamin Moore & Co.:
1) Primer (Unfinished Surfaces): Ultra Spec HP Acrylic Metal Primer HP04.
2) First and Second Coats: Ultra Spec 500 Waterborne Interior Semi-Gloss 539.
b. Behr Process Corporation:
1) Primer (Unfinished Surfaces): Premium Plus Multi-Surface Primer, 436
2) First and Second Coats: Behr Pro i300 Interior Semi-Gloss Paint, 370
c. PPG Paints:
1) Primer (Unfinished Surfaces): Pitt Tech Plus 4020PF
2) First and Second Coats: Speedhide Zero Interior Semi-Gloss Latex Enamel, 6-4510XI Series.
d. Sherwin-Williams Company:
1) Primer (Unfinished Surfaces): ProCryl Universal Primer, B66-1310 Series.
2) First and Second Coats: ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series.
e. McCormick Paints:
1) Primer (Unfinished Surfaces): McCormick Underlok Interior/Exterior Acrylic Latex Multi Purpose Primer 06452.
2) First and Second Coats: McCormick Interlok Interior/Exterior Acrylic Semi-Gloss Urethane DTM 45 Series or comparable product.

H. Cotton or Canvas Insulation-Covering Substrates, Including Pipe and Duct Coverings:
   1. Benjamin Moore & Co.:
      a. Primer: Ultra Spec 500 Interior Zero VOC Latex Primer N534.
      b. First and Second Coats: Ultra Spec 500 Interior Zero VOC Latex Eggshell, N538.
   2. Behr Process Corporation:
      a. Primer: Kilz 2 Interior/Exterior Water-Base Primer, 2000
      b. First and Second Coats: Behr Pro i300 Interior Eggshell Paint, 330
   3. PPG Paints:
      a. Primer: Speedhide Zero Int. Latex Quick Drying Primer/Sealer, 6-4900XI.
      b. First and Second Coats: Speedhide Zero Interior Eggshell Latex Enamel, 6-4310XI Series.
   4. Sherwin-Williams Company:
      a. Primer: Multi-Purpose Latex Primer B51-450
      b. First and Second Coats: ProMar 200 Zero VOC Latex Eg-Shel, B202600 Series.
   5. McCormick Paints:
      a. Top Coat: McCormick Total Advantage Zero VOC Professional Coating Eggshell 09 Series.

I. Exposed PVC Piping:
   1. Benjamin Moore & Co.:
      a. Bond Coat: STIX Waterborne Bonding Primer SXA-110; Insl-X.
      b. First and Second Coats: Ultra Spec 500 Interior Zero VOC Latex Eggshell, 538.
   2. Behr Process Corporation:
      a. Primer: Kilz Adhesion Interior/Exterior Water-Base Bonding Primer, 2111
      b. First and Second Coats: Behr Pro i300 Interior Eggshell Paint, 330
   3. PPG Paints:
      a. Bond Coat: SEAL GRIP 17-921 Interior/Exterior 100% Acrylic Universal Primer/Sealer.
      b. First and Second Coats: Speedhide Zero Interior Eggshell Latex Enamel, 6-4310XI Series.
   4. Sherwin-Williams Company:
      a. Bond Coat: Zero VOC Multi Purpose Primer B 51-450 Series.
      b. First and Second Coats: ProMar 200 Zero VOC Latex Eg-Shel, B202600 Series.
   5. McCormick Paints:
      a. Prime Coat: McCormick Underlok Interior/Exterior Acrylic Latex Multi Purpose Primer 06452.
      b. Top Coat: McCormick Total Advantage Zero VOC Professional Coating Eggshell 09 Series.

END OF SECTION

SECTION 09 96 00 - HIGH-PERFORMANCE COATINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section includes surface preparation and application of high-performance coating systems on the following substrates:
   1. Exterior Substrates:
      a. Exposed concrete designated for painted finish.
      b. Concrete masonry units (CMU) - new and existing painted.
      c. Exposed steel canopy structure and other rooftop structures.
      d. Exposed angle lintels and hung plates.
   2. All substrates listed in the schedule at the end of this Section may not be required for this project.

1.2 DEFINITIONS

A. Gloss Ranges:
   1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
   2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
   3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
   4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.3 SUBMITTALS

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

B. Samples for Initial Selection: For each type of finish-coat product indicated.

C. Samples for Verification: For each type of coating system and in each color and gloss of finish coat indicated.
   1. Submit Samples on rigid backing, minimum 8 inches square.
   2. Step coats on Samples to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

D. Product List: For each product indicated. Cross-reference products to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
      a. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 95 deg F.

B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Benjamin Moore & Co.

B. Tnemec Company, Inc.

C. International Paint LLC.

D. PPG Paints.

E. Sherwin-Williams Company.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

A. Material Compatibility:
   1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. Provide products of same manufacturer for each coat in a coating system.

B. Colors: As selected by Architect from manufacturer's full range.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
   1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
      a. Masonry (CMU): 12 percent.
      b. Concrete: 12 percent.
   2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
   3. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
   4. Coating application indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
   1. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.

C. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers as required to produce coating systems indicated.

D. CMU Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

E. Steel Substrates: Remove rust and loose mill scale.
   1. Clean using methods recommended in writing by coating manufacturer.
   2. Blast clean according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

3.3 APPLICATION

A. Apply in accordance with manufacturer's instructions.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
   1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
   2. Wall Surfaces: Receive final color approvals following Architect's review of Intermediate Coats, before proceeding.
   3. Omit primer over metal surfaces that have been shop primed and touchup painted.
   4. If undercoats or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
   5. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

C. Apply high-performance coatings according to manufacturer's written instructions.
   1. Use applicators and techniques suited for coating and substrate indicated.
   2. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
      a. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
   3. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.

4. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

D. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

E. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
1. Wall Surfaces: Tint Prime Coat a lighter shade to facilitate identification; tint Prime Coat to match color of finish coat, but provide sufficient difference in shade to distinguish Prime Coat from Intermediate Coat used for final color selections.
2. Other Surfaces: Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

F. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

G. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

H. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

I. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

3.4 CLEANING

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.5 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Concrete and CMU Substrates, Vertical Surfaces:
1. Basis-of-Design:
a. Sherwin-Williams Company:
1) Prime Coat - New CMU Surfaces: S-W Prep Rite Int/Ext. Block Filler B25W25.
2) Intermediate Coat - New and Existing Painted Surfacec: S-W Prep Rite Pro Block Primer, B51-600 Series.
3) Topcoat: S-W Resilience Exterior Acrylic Latex, Satin K43 Series.

2. Comparable Products: Acceptable equivalent by other named manufacturers.

B. Steel Substrates: Exposed structural steel, rooftop structures, angle lintels and hung plate substrates.
   1. Pigmented Polyurethane over Zinc-Rich Primer System:
      a. Benjamin Moore & Company:
         1) Prime Coat: Corotech Organic Zinc Rich Primer V170.
         2) Intermediate Coat: Corotech Aliphatic Acrylic Urethane Coating Gloss V500.
         3) Corotech Aliphatic Acrylic Urethane Coating Gloss V500.
      b. Devoe Coatings:
         1) Prime Coat: Cathacoat 302H.
         2) Intermediate Coat: Bar-Rust 231 Series.
         3) Topcoat - Gloss: Devthane 379.
      c. International Paint LLC:
         1) Prime Coat: Cathacoat 302H.
         2) Intermediate Coat: Bar-Rust 231 Series.
         3) Topcoat - Gloss: Devthane 379 Series.
      d. PPG Paints:
         1) Prime Coat: Amercoat 68HS VOC Zinc Rich Epoxy Primer.
         2) Intermediate Coat: Amerlock 2 VOC Epoxy Coating.
         3) Topcoat: Amershield VOC Acrylic Polyurethane.
      e. Sherwin-Williams Company:
         1) Prime Coat: S-W Zinc Clad XI WB Inorganic Zinc-Rich Coating.
         2) Intermediate Coat: S-W Pro Industrial Waterbased Catalyzed Epoxy B73-300 Series.
         3) Topcoat: S-W Acrolon Waterbased Acrolon 100 WB Urethane Gloss Enamel.
      f. Tnemec Company, Inc.:
         1) Prime (Shop) Coat: Series 94H2O Hydro Zinc. Refer to applicable Division 05 Section.
         2) Intermediate Coat: Series 27 W.B. Typoxy.
         3) Topcoat - Gloss: Gold Standard Fluoropolymer Series V1070.

C. Galvanized-metal substrates should not be chromate passivated if primers are field applied. If galvanized metal is chromate passivated, consult manufacturers for appropriate surface preparation and primers.

D. Galvanized-Metal Substrates:
   1. Pigmented Polyurethane over Epoxy Primer System:
      a. Benjamin Moore & Company:
         1) Prime Coat: Corotech Waterborne Bonding Primer V175.
         2) Intermediate Coat: Corotech Aliphatic Acrylic Urethane Coating Gloss V500.
         3) Corotech Aliphatic Acrylic Urethane Coating Gloss V500.
      b. International Paint LLC:
         1) Prime Coat: Devran 203.
         2) Intermediate Coat: Devthane 379 Series.
         3) Topcoat: Devthane 379 Series.
      c. PPG Paints:
         1) Prime Coat: Amerlock 2 VOC.
         2) Intermediate Coat: Amerlock 2 VOC.
         3) Topcoat: Amershield VOC Acrylic Polyurethane.

d. Sherwin-Williams Company:
   1) Prime Coat: Pro Cryl Universal Primer B66-1310 or, for high abrasion areas: DTM Wash Primer B71Y00001.
   2) Intermediate Coat: Pro Industrial Waterbased Catalyzed Epoxy B73-300 Series.
   3) Topcoat: S-W Acrolon Waterbased Acrolon 100 WB Urethane Gloss Enamel.
e. Tnemec Company, Inc.:
   1) Prime Coat: Series 27 W.B. Typoxy.
   2) Intermediate Coat: Series 27 W.B. Typoxy.
   3) Topcoat - Gloss: 1080 Endura-Shield.

END OF SECTION

SECTION 10 28 00 - TOILET ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Accessories for toilet rooms.

B. Grab bars.

1.2 REFERENCE STANDARDS

A. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015.

B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

C. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2011.

D. ASTM C1036 - Standard Specification for Flat Glass; 2016.

E. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2008 (Reapproved 2013).

1.3 SUBMITTALS

A. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

1.4 COORDINATION

A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

PART 2 PRODUCTS

2.1 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
   1. Grind welded joints smooth.
   2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.

B. Keys: Provide 2 keys for each accessory to Owner; master key all lockable accessories.

C. Stainless Steel Sheet: ASTM A666, Type 304.

D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.

E. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

F. Adhesive: Two component epoxy type, waterproof.

G. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

H. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.2 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

B. Chrome/Nickel Plating: ASTM B456, SC 2, polished finish, unless otherwise noted.

C. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.

2.3 TOILET ROOM ACCESSORIES

A. The design for each accessory is based on products indicated on the Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.

D. Verify that field measurements are as indicated on drawings.

3.2 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.3 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.4 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

SECTION 10 44 00 - FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fire extinguishers.

B. Accessories.

1.2 REFERENCE STANDARDS

A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.

1.3 SUBMITTALS

A. Product Data: Provide extinguisher operational features.

B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Strike First Corporation of America: www.strikefirstusa.com.

B. JL Industries, Inc: www.jlindustries.com.

C. Larsen's Manufacturing Co: www.larsensmfg.com/#sle.

D. Potter-Roemer: www.potterroemer.com/#sle.

2.2 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

B. Dry Chemical Type Fire Extinguishers: Steel tank, with pressure gage.

1. Class Multi-purpose 4-A:80-B:C.
2. Size 10 pounds.
3. Finish: Baked enamel, color as selected.

2.3 ACCESSORIES

A. Extinguisher Brackets: Formed steel, galvanized and enamel finished.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Secure rigidly in place.

END OF SECTION

SECTION 10 73 10 - PROTECTIVE COVERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Engineering design, fabrication and installation of complete welded, extruded aluminum canopies.

1.2 RELATED REQUIREMENTS

A. Section 07 90 05 - Joint Sealants.

1.3 REFERENCE STANDARDS

A. ASCE 7-95 - Minimum Design Loads for Buildings and Other Structures.

B. AWS D1.1/D1.1M - Structural Welding Code - Steel.

C. AWS D1.2 - Structural Welding Code - Aluminum.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product information, specifications and installation instructions for building components and accessories.

B. Shop Drawings: Submit detailed drawings, all mechanical joint locations with complete details, connections, jointing and accessories.

C. Certification: Submit design calculations signed by a Registered Professional Engineer, licensed in the Commonwealth of Virginia. Design calculations shall state that the protective cover system design complies with the wind requirements of ASCE 7, the stability criteria of applicable building code, and all other governing criteria.

D. Samples for Initial Selection: For each colored or finished component of each type of protective cover indicated.
   1. Include similar Samples of accessories involving color selection.

E. Welding certificates.

F. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Protective cover shall be wholly produced by a recognized manufacturer with at least five years experience in the design and fabrication of extruded aluminum protective cover systems. Components shall be assembled in shop to greatest extent possible to minimize field assembly. Protective cover shall be installed by manufacturer. Third party installation is not acceptable.

B. Welding: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   2. AWS D1.2, "Structural Welding Code - Aluminum."

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of awnings in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Where awning installation is indicated to fit to other work, verify dimensions of other work by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for fenestration operation throughout the entire operating

range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer and fabricator agree to repair or replace components that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures.
      b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   2. Warranty Period: 5 years from date of Substantial Completion.

B. 20-year warranty on finish including checking, crazing, peeling, chalking, fading and/or adhesion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design: Mapes Architectural Canopies; Super Lumideck Hanger Rod Canopy, www.mapescanopies.com.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering covers that may be incorporated into the Work include, but are not limited to, the following:
   1. Dittmer Architectural Aluminum; www.dittdeck.com.
   2. MASA Architectural Canopies; www.architecturalcanopies.com.
   3. Perfection Architectural Systems, LLC.; www.perfectionarch.com.

2.2 MATERIALS

A. Aluminum Members: All sections shall be extruded aluminum 6063 alloy, heat treated to T-6 temper.

B. Fasteners: Fasteners shall be aluminum, 18-8 stainless steel or 300 series stainless steel.

C. Gaskets: Gaskets shall be dry seal santoprene pressure type.

D. Sealants: Single component silicone, in color to match sheets and extrusions; refer to Section 07 90 05 - Joint Sealants.

2.3 COMPONENTS

A. Beams: Beams shall be open-top tubular extrusion of size and shape shown on drawings, top edges thickened for strength and designed to receive deck members in self-flashing manner. Structural ties shall be installed in tops of all beams.

B. Deck: Deck shall be extruded self-flashing sections interlocking into a composite unit. Closures at deck ends shall be welded plates.

C. Hanger Rods: Galvanized/zinc plated; minimum 3/4 inch diameter pipe with attachment hardware.

D. Fascia:
   1. Fascia shall be extruded aluminum; manufacturer's custom 12 inch shape.
   2. Provide on all sides of protective cover, including side against exterior wall construction.

E. Flashing: Flashing shall be 0.040 aluminum (min.). All thru-wall flashing by others.

F. Accessories: Flashings, brackets and other items necessary for a complete installation.

1. Connect to adjacent downspouts draining into storm drain system, as available to location; perforated drainage at other locations.

2.4 FABRICATION

A. Bent Construction: Beams shall be factory welded with neatly mitered corners into one-piece rigid bents. All welds shall be smooth and uniform using an inert gas shielded arc. Suitable edge preparation shall be performed to assure 100% penetration. Grind welds only where interfering with adjoining structure to allow for flush connection. Field welding is not permitted. Rigid mechanical joints shall be used when shipping limitations prohibit the shipment of fully welded bents.

B. Deck Construction: Deck shall be manufactured of extruded modules that interlock in a self-flashing manner. Interlocking joints shall be positively fastened at 8" O.C. creating a monolithic structural unit capable of developing the full strength of the sections. The fastenings must have minimum shear strength of 350 pounds each. Deck shall be assembled with sufficient camber to offset dead load deflection.

C. Concealed Drainage: Water shall drain from covered surfaces into integral fascia gutter and directed to indicated discharge.

D. Form exposed field connections with hairline joints, flush and smooth, using concealed fasteners where possible.

2.5 FINISHES

A. Flouropolymer Finish: AAMA 605.2, two coat; color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight.
   1. Match Architect's sample.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for supporting members, inserts, installation tolerances, and other conditions affecting performance.

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

3.2 INSTALLATION, GENERAL

A. Erection:
   1. Installation to be in strict accordance with manufacturer's shop drawings.
   2. Protect the finish of components during handling and erection.
   3. Protective cover shall be erected true to line, level and plumb.

B. Protective cover components shall be cleaned promptly after installation.

C. Extreme care shall be taken to protect materials during and after installation.

END OF SECTION

SECTION 32 1216 - ASPHALT PAVEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The provisions of the Contract Documents apply to the work of this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Hot-mix asphalt paving over prepared subbase.
2. Hot –mix asphalt patching.
3. Hot-mix asphalt overlays.
4. Asphalt surface treatments
    a) Coal tar sealant

1.3 SUBMITTALS

A. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.

B. Material Certificates: Certificates signed by manufacturers certifying that each material complies with requirements.

C. Traffic maintenance and Work Area Protection Plan: Submit a plan indicating sequencing and measures to be used for the maintenance and protection of traffic during operations within or immediately adjacent to existing roadways open to vehicular traffic. The Architect and the Virginia Department of Transportation must approve this plan prior to commencement of work within the Right-of-Way.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed hot-mix asphalt paving similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Asphalt paving materials and installation shall conform to the requirements of the latest edition of the Virginia Department of Transportation (VDOT) Road and Bridge Specifications and Road and Bridge Standards.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if substrate is wet or excessively damp or if the following conditions are not met:

1. Prime and Tack Coats: Minimum ambient temperature of 50 deg F (10 deg C), and when temperature has not been below 35 deg F (1 deg C) for 12 hours immediately prior to application.
2. Asphalt Base Course: Minimum surface temperature of 40 deg F (4 deg C) and rising at time of placement.
3. Asphalt Surface Course: Minimum surface temperature of 40 deg F (4 deg C) and rising at time of placement.

1.6 TESTING AND INSPECTION

A. Within the road Right-of-Way and in the bus loop, VDOT inspectors shall observe the asphalt placement. Coordinate the necessary inspection schedule with the Ashland Residency.

B. The Owner's testing agency will observe the asphalt placement in the parking lots and on-site areas not in Right-of-Way.

PART 2 - PRODUCTS

2.1 ASPHALT-AGGREGATE MIXTURE

A. General: Provide plant-mixed, hot-laid asphalt-aggregate mixture complying with the requirements of the VDOT Road and Bridge Specifications and as recommended by local paving authorities to suit project conditions.

2.2 ASPHALT MATERIALS

A. Tack Coat: ASTM D 977, emulsified asphalt or ASTM D 2397, cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application.

B. Prime Coat: Asphalt emulsion prime conforming to VDOT requirements.

2.3 AUXILIARY MATERIALS

A. Paving Geotextile: Nonwoven polypropylene, specifically designed for paving applications, resistant to chemical attack, rot, and mildew.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.

B. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.

C. Notify Architect in writing of any unsatisfactory conditions. Do not begin paving installation until these conditions have been satisfactorily corrected.

3.2 MAINTENANCE AND PROTECTION OF TRAFFIC

A. Utilize flagmen, barricades, warning signs and warning lights as required by the Virginia Work Area Protection Manual.

3.3 PATCHING AND REPAIRS

A. Patching: Saw cut perimeter of patch and excavate existing pavement section to sound base. Recompact new subgrade. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically.

1. Tack coat faces of excavation and allow to cure before paving.

2. Fill excavation with dense-graded, hot-mix asphalt base mix and, while still hot, compact flush with adjacent surface.

B. Leveling Course: Install and compact leveling course consisting of dense-graded, hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch (25 mm) in existing pavements.

1. Install leveling wedges in compacted lifts not exceeding 3 inches (75 mm) thick.

C. Crack and Joint Filling: Remove existing filler material from cracks or joints to a depth of 1/4 inch (6 mm). Refill with asphalt joint-filling material to restore watertight condition. Remove excess filler that has accumulated near cracks or joints.

D. Tack Coat: Apply uniformly to existing surfaces of previously constructed asphalt or Portland cement concrete paving and to surfaces abutting or projecting into new, hot-mix asphalt pavement. Apply at a uniform rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m) of surface.

1. Allow tack coat to cure undisturbed before paving.

2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillage and clean affected surfaces.

3.4 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.

3.5 GEOTEXTILE INSTALLATION

A. Apply bond coat, consisting of asphalt cement, uniformly to existing surfaces at a rate of 0.20 to 0.30 gal./sq. yd. (0.8 to 1.2 L/sq. m).

B. Place paving geotextile promptly according to manufacturer's written instructions. Broom or roll geotextile smooth and free of wrinkles and folds. Overlap longitudinal joints 4 inches (100 mm) and transverse joints 6 inches (150 mm).

1. Protect paving geotextile from traffic and other damage and place overlay paving the same day.

3.6 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt mix on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to 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 thickness indicated.
2. Spread mix at minimum temperature of 225 deg F (107 deg C).

B. Place paving in consecutive strips not less than 10 feet (3 m) wide, except where 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. Complete asphalt base course for a section before placing intermediate or surface courses.

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.

3.7 JOINTS

A. Construct joints between old and new pavement, or between successive days work, to ensure 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.
2. Offset longitudinal joints in successive courses a minimum of 6 inches (150 mm).
3. Offset transverse joints in successive courses a minimum of 24 inches (600 mm).
4. Construct transverse joints as required by the VDOT Road and Bridge Specifications.
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.

3.8 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 vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).

B. Breakdown Rolling: Accomplish breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Repair surfaces by loosening displaced material, filling with hot-mix asphalt, and rerolling to required elevations.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling, while hot-mix asphalt is still hot enough to achieve indicated density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 95 percent of reference laboratory density according to ASTM D 1559.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm. Surface course average density shall be 95 percent of reference laboratory density.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while still hot, with back of rake or smooth iron. Compact thoroughly using tamper or other satisfactory method. Edges adjacent to curbs and curb and gutter sections shall be flush with the edge of concrete.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials. Remove paving course over area affected 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.

3.9 INSTALLATION TOLERANCES

A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch (13 mm).

2. Surface Course: Plus 1/4 inch (6 mm), no minus.

B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch (6 mm).

2. Surface Course: 3/16 inch (3 mm).

3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch (6 mm).

C. Check surface areas at intervals as directed by Architect.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing agency to perform field inspections and tests and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from requirements.

B. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with requirements.

C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with requirements.

END OF SECTION 32 1216

SECTION 32 1313 - SITE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The provisions of the Contract Documents apply to the work of this Section.

1.2 DESCRIPTION OF WORK:

A. Extent of Portland cement concrete paving is shown on drawings, including:

1. Curbs and gutters
2. Walkways
3. Parking area pavement.

1.3 SUBMITTALS

A. Provide certification that all materials meet VDOT standards for the class of concrete required.

1.4 JOB CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.

1. Use flexible spring steel forms or laminated boards to form radius bends as required.
2. Coat forms with a nonstaining form release agent that will not discolor or deface surface of concrete.

B. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM A 185.

C. Reinforcing Steel: ASTM A 615, Grade 60, deformed

D. Concrete Materials: Comply with requirements of applicable Division 3 sections for concrete materials, admixtures, bonding materials, curing materials, and others as required.

E. Expansion Joint Materials: Comply with requirements of applicable Division 7 sections for preformed expansion joint fillers and sealers.

F. Antispalling Compound: Combination of boiled linseed oil and mineral spirits, complying with AASHTO M-233.

G. Liquid-Membrane Forming and Sealing Curing Compound: Comply with VDOT Road and Bridge Specifications.

2.2 CONCRETE MIX, DESIGN, AND TESTING

A. Comply with requirements of applicable Division 3 sections for concrete mix design, sampling and testing, and quality control or VDOT Road and Bridge Specifications whichever is more stringent.

B. Design mix to produce normal-weight concrete consisting of Portland cement, aggregate, water-reducing or high-range water-reducing admixture (superplasticizer), air-entraining admixture, and water to produce the following properties:

1. Comply with the requirements of VDOT Std. Class A3 Concrete, unless otherwise indicated.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

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

B. Proof-roll prepared subbase surface to check for unstable areas and need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving,

3.2 FORM CONSTRUCTION

A. Set forms to required grades and lines, braced and secured. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.

B. Check completed formwork for grade and alignment to following tolerances:

1. Top of forms not more than 1/8 inch in 10 feet.

2. Vertical face on longitudinal axis, not more than 1/4 inches in 10 feet.

C. Clean forms after each use and coat with form release agent as required to ensure separation from concrete without damage.

3.3 REINFORCEMENT

A. Locate, place and support reinforcement as specified in Division 3 sections, unless otherwise indicated.

3.4 CONCRETE PLACEMENT

A. General: Comply with requirements of applicable Division 3 sections for mixing and placing concrete or VDOT Road and Bridge Specifications whichever is more stringent.

B. Do not place concrete until subbase and forms have been checked for line and grade. Moisten subbase if required 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.

C. Place concrete by methods that prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with 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 dislocation of reinforcing, dowels, and joint devices.

D. Deposit and spread concrete in a continuous operation between transverse joints as far as possible. If interrupted for more than 1/2 hour, place a construction joint.

E. Fabricated Bar Mats: Keep mats clean and free from excessive rust, and 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 to adjacent mats.

F. Place concrete in 2 operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

G. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer or use bonding agent if acceptable to Architect.

H. Curbs and Gutters: Automatic machine may be used for curb and gutter placement. If machine placement is to be used, submit revised mix design and laboratory test results that meet or exceed minimums indicated. Machine placement must produce curbs and gutters to required cross-section, lines, grades, finish, and jointing as indicated for formed concrete. If results are not acceptable, remove and replace with formed concrete meeting requirements.

3.5 JOINTS

A. General: Construct expansion, weakened-plane (contraction), and construction joints true to line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.

B. Weakened-Plane (Contraction) Joints: Provide weakened-plane (contraction) joints, sectioning concrete into areas as shown on drawings. Construct weakened-plane joints for a depth equal to at least 1/4 concrete thickness, as follows:

1. Tooled Joints: Form weakened-plane joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.

2. Sawed Joints: Form weakened-plane joints with powered saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut joints into hardened concrete as soon as surface will not be torn, abraded, or otherwise damaged by cutting action.

3. Inserts: Use embedded strips of metal or sealed wood to form weakened-plane joints. Set strips into plastic concrete and carefully remove strips after concrete has hardened.

C. Construction Joints: Place construction joints at end of placements and at locations where placement operations are stopped for more than 1/2 hour, except where such placements terminate at expansion joints.

1. Construct joints as indicated or, if not indicated, use standard metal keyway-section forms.

D. Expansion Joints: Provide premolded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks, and other fixed objects, unless otherwise indicated.

E. Locate expansion joints at 50 feet o.c. for each pavement lane unless otherwise indicated.

F. Extend joint fillers full width and depth of joint, not less than 1/2 inch or more than 1 inch below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface.

G. Provide joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required, lace or clip joint filler sections together.

H. Protect top edge of joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.

I. Fillers and Sealants: Comply with requirements of applicable Division 7 sections for preparation of joints, materials, installation, and performance.

J. Refer to Drawings for scoring patterns for:

1. Selected sidewalk areas

2. Service Areas

3.6 CONCRETE FINISHING

A. After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

B. After floating, test surface for trueness with a 10-ft. straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

C. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to 1/2-inch radius, unless otherwise indicated. Eliminate tool marks on concrete surface.

D. After completion of floating and when excess moisture or surface sheen has disappeared, complete troweling and finish surface as follows:

1. Broom finish by drawing a fine-hair broom across concrete surface perpendicular to line of traffic. Repeat operation if required to provide a fine line texture acceptable to Architect.

2. Exposed-Aggregate Finish: At handicap ramps and where indicated on drawings, by applying an approved retardant curing compound to the surface. Allow minimum 12 hours of setting time before washing surface to expose a maximum of (1/3) one-third of stone surface. Aggregate shall be brown Riverstone having a uniform size and color for each subsequent concrete pour. Aggregate size shall range between 1/2” and 3/4”.

E. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Architect.

3.7 CURING

A. Protect and cure finished concrete paving in compliance with applicable requirements of Division 3 sections. Use membrane-forming curing and sealing compound or approved moist-curing methods.

3.8 REPAIRS AND PROTECTIONS

A. Repair or replace cracked, broken or defective concrete curbs and curb and gutter, as directed by Architect.

B. Replace cracked, broken or defective concrete sidewalks.

C. Repair or replace cracked, broken or defective concrete pavement, as directed by Architect.

D. Drill test cores where directed by Architect when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy adhesive.

E. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

F. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just before final inspection.

END OF SECTION 32 1313

SECTION 32 1700 - PAVEMENT MARKINGS, SIGNS AND SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The provisions of the Contract Documents apply to the work of this Section.

1.2 SUMMARY

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

1. Establishing the location of pavement markings and applying pavement markings for parking space lines, traffic control and accessible spaces.
2. Installation of signs for traffic control and accessible spaces.

1.3 QUALITY ASSURANCE

A. All work and materials shall conform to the requirements of the latest edition of the Virginia Department of Transportation (VDOT) Road and Bridge Specifications and Road and Bridge Standards.

B. All materials for signs shall conform to the requirements of the latest edition of the Virginia Department of Transportation (VDOT) Road and Bridge Specifications and Road and Bridge Standards and to the requirements of the latest edition of the Manual of Uniform Traffic Control Devices for traffic signs.

C. Installer Qualifications: Engage an experienced installer, who has successfully completed striping and signage projects similar in size and complexity to this project. The installer's primary business (defined as a minimum of 60% of total billings) shall be striping and signage.

1.4 SUBMITTALS

A. Product Data and written confirmation that the following materials are included on VDOT's list of approved construction materials:

1. Pavement marking paint
2. Signs
3. Posts

B. Installer Qualifications. Must have VDOT Certification for any work within the right-of-way.

PART 2 - PRODUCTS

2.1 PAVEMENT MARKING PAINT

A. Paint shall be Type A, water emulsion base, traffic paint conforming to the requirements of Section 704 of the VDOT Road and Bridge Specifications and Federal Specification TT-P-1952. Color shall be white unless otherwise indicated.

B. Curb painting color along fire lanes and cross walks shall be yellow, unless otherwise indicated.

C. Type B thermoplastic lane markings are required within VDOT rights-of-way.

2.2 PAINT APPLICATOR

A. Provide hand-operated push-type applicator machine of a type commonly used for application of paint to pavement surfaces. Paint applicator machine shall be acceptable for marking small street and parking areas. Applicator machine shall be equipped with the necessary paint tanks and spraying nozzles and shall be capable of applying paint uniformly at coverage specified.

2.3 SIGNS AND POSTS

A. Signs shall conform to the requirements of Section 701 of the VDOT Road and Bridge Specifications. Signs shall be fabricated with encapsulated lens sheeting.

B. Signposts for traffic control signage shall be 4” x 4” treated wood conforming to the requirements of Section 236 of the VDOT Road and Bridge Specifications.

C. Utilize metal posts for fire-lane signage and for signage at accessible parking spaces.

2.4 CONCRETE

A. Concrete shall be Class A3, General concrete, conforming to the requirements of Section 217 of the VDOT Road and Bridge Specifications.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION FOR PAVEMENT MARKING

A. Apply pavement markings only when the ambient temperatures is above 50°F and less than 95°F, unless otherwise approved.

B. Allow pavement to cure for a period of not less than 7 days before applying pavement marking.

C. Clean surfaces thoroughly before application of paint. Remove, dust, dirt and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods as required.

D. Remove existing pavement markings, residual curing compounds and other coating adhering to the pavement with scrapers, wire brushes, waterblasting, sandblasting or mechanical abrasion as required. Areas of existing pavement affected by oil or grease shall be scrubbed with an approved chemical and rinsed thoroughly. Seal oil soaked areas with shellac or primer after cleaning.

E. Pavement surfaces shall be dry and clean prior to painting. Pavement markings shall not be applied within 24 hours following rain or other inclement weather or when rain is imminent.

F. Apply seal coat across the existing pavement to provide a uniform surface appearance.

3.2 APPLICATION OF PAVEMENT MARKING

A. Apply paint in accordance with the requirements of Section 704 of the VDOT Road and Bridge Specifications.

B. Lay out lines and markings to the width and length as indicated. All parking space lines shall be 4 inches wide.

C. Apply paint with an approved paint applicator.

D. Apply paint at manufacturer recommended rates to provide a minimum 15 mil wet thickness.

3.3 INSTALLATION OF SIGNS

A. Install signs on signposts in accordance with the requirements of Section 701 of the VDOT Road and Bridge Specifications.

B. Install signposts in concrete foundation to a depth of 3 feet minimum by 12 inches in diameter.

END OF SECTION 32 1700