

Repair Cape Lookout Lighthouse Cape Lookout National Seashore

**South East Region
North Carolina**

PMIS #: CALO 226858

SPECIFICATIONS



NATIONAL PARK SERVICE
JULY 7, 2023

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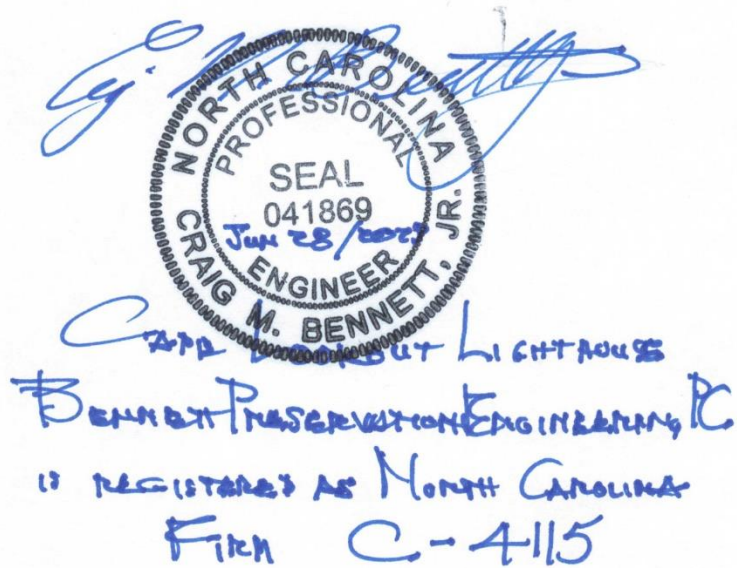
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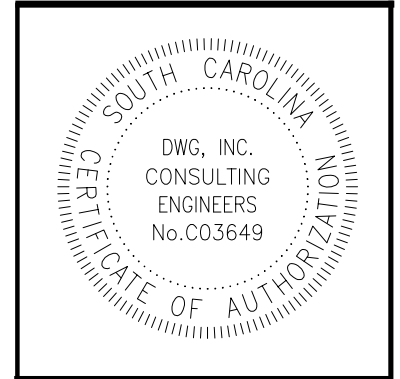
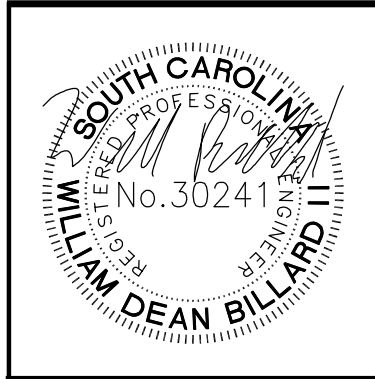
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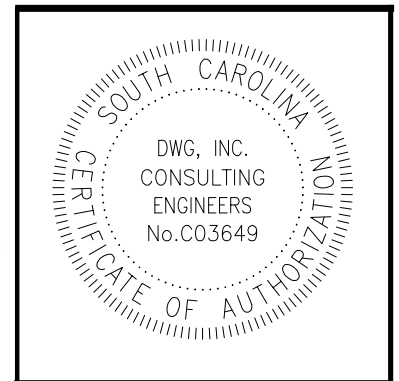
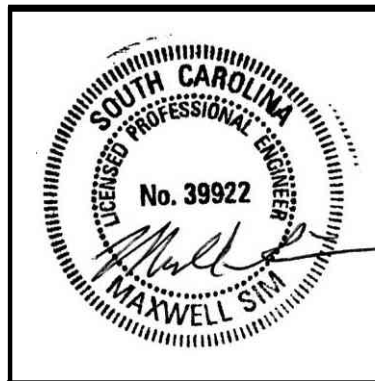


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END OF SECTION 000107

SECTION 01 11 00 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following:

1. Work Covered by Contract Documents
2. Work Phases
3. Work Under Other Contracts
4. Government-Furnished Materials
5. Contractor Use of Site
6. Public Use of Site
7. Occupancy Requirements for Buildings
8. Conduct of Operations
9. Work Restrictions
10. Special Construction Requirements
11. Soils Investigation Report
12. Additional Reports

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Location: Cape Lookout Lighthouse, Located on South Core Banks in Harkers Island, North Carolina, 28531. To visit the site, utilize Cape Lookout Ferry Service.
- B. The Work consists of:
1. Repair the Cape Lookout Lighthouse which includes removal of non-breathable exterior masonry coatings and will replace with appropriate finish coating replicating historic design. Masonry scope is intended to include removal of deteriorated mortar and bricks; crack repairs; repointing of brick with lime-based mortar; and repair and treatment of metal staircase, central column, and landings. Additionally, it is intended to include replacement of exterior doors; removal and replacement of current windows with windows of historic design and materials; repair, replacement, and/ or treatment of the Watch Room Balcony and metal components of the watch room interior; repair, replacement, and/or treatment of the Lantern metal components; and repair, rehabilitation, and corrosion- preventative refinishing of the Lantern Balcony.
 2. The work above is broken out into various Contract Line Items, some of which are bid options and rely upon other tasks to be completed prior to that line item to start. Please see 01 27 00 for additional information in regards to these Contract Line Items and how they relate.
- C. Project will be constructed under a single prime contract.

1.3 CONTRACTOR USE OF SITE

- A. General: Contractor shall have full use of the site for construction operations during the construction period. Contractor's use of the site is limited only by the Government's right to perform work or to retain other contractors on portions of Project.
- B. General: Contractor shall have use of site for construction operations. Limit use of premises to areas within the Construction limits indicated on drawings. Do not disturb portions of Project site beyond areas in which the Work is indicated unless pre-approved by the park.
 - 1. Existing sidewalks, stairs, and other items inside of construction limits to remain
 - 2. If additional area is required for laydown, staging, parking or material storage, provide plan to park for review and approval.
 - a. Plan shall include duration in which area is required, limits of disturbance, and protection required to items inside of the area.
- C. Storage of Materials: Confine storage of materials to staging & storage area shown on plans or other approved areas by the CO as noted in 1.3.B.2
- D. Parking:
 - 1. On Site - Confine parking to staging area as shown on plans on island, or other approved areas by NPS as noted in 1.3.B.2. Provide site plan of parking areas on island.
 - 2. At Harkers Island Visitors Center – Coordinate parking locations with NPS prior to work
- E. Stockpiling: Confine stockpiling to staging area shown on plans or other approved areas by the CO.
- F. Job Site Trailer: General Contractor to provide a site plan to identify location of job site trailer inside of the limits of disturbance. If this trailer requires to be outside of this area, provide a request to NPS and plan per 1.3.B.2
- G. Preservation of Natural Features:
 - 1. Prevent damage to natural surroundings. Restore damaged areas, repairing or replacing damaged trees and plants, at no additional expense to the Government.
 - 2. Provide temporary barriers to protect existing trees and plants and root zones.
 - 3. Do not remove, injure, or destroy trees or other plants without prior approval. Consult with Contracting Officer (CO) and remove agreed-on roots and branches that interfere with construction.
 - 4. Do not fasten ropes, cables, or guys to existing trees.
 - 5. Carefully supervise excavating, grading, filling, and other construction operations near trees to prevent damage.
- H. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Government employees, and emergency vehicles at all times. Do not use for parking or storage of materials.
 - 1. Schedule deliveries to minimize use of driveways and entrances.
 - 2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- I. Construction Camp: Establishment of a camp within park will not be permitted.

- J. Hauling Restrictions: Comply with legal load restrictions in hauling of materials. Load restrictions on park roads are identical to state load restrictions with such additional regulations as may be imposed by the Park Superintendent. Information regarding rules and regulations for vehicular traffic on park roads may be obtained from the Office of the Park Superintendent. A special permit will not relieve Contractor of liability for damage which may result from moving of equipment.

1.4 PUBLIC USE OF SITE

- A. The building will be closed to the public during construction.
- B. Contractor shall conduct his operations to ensure the least inconvenience to public. Road closures may be permitted, when required, upon specific approval of Contracting Officer for a maximum of 72 hours.

1.5 CONDUCT OF OPERATIONS

- A. Contractor shall conduct his operations in conformance with rules and regulations promulgated by the Secretary of the Interior for the National Park Service, and applicable park rules and regulations prescribed by Park Superintendent.
- B. Work on Saturdays, Sundays or Federal holidays may not be performed unless stated in the Work Restrictions below or without prior consent from the Contracting Officer. Submit requests 2 business/calendar days in advance of the work to the Contracting Officer for approval. Work at night may not be performed to comply with night sky park requirements.
- C. No signs or advertisements (except those specified herein) shall be displayed on the construction site or within the park unless approved by the Contracting Officer.
- D. Contractor may utilize a personal barge for transportation of materials and labor. The following restrictions apply. Provide NPS with a request prior to work.
 - 1. Barge may not exceed 8'-0" x 26'-0" in size and may only draft 3'-0"
 - 2. Contractor may dock barge at an NPS slip at Harkers Island Visitors Center harbor with no fee, including over night and on weekends
 - 3. Contractor may load and unload from Harkers Island Visitors Center harbor

1.6 WORK RESTRICTIONS

- A. On-Site Work Hours: Work shall be generally performed during daylight hours, Monday through Friday, except when otherwise indicated.
 - 1. Weekend Hours: To be determined on a case by case scenario
 - 2. Early Morning Hours: To be determined on a case by case scenario
 - 3. If utilizing public ferry for transportation, GC subject to ferry schedule
- B. Existing Utilities

1. Existing Utilities: Notify Contracting Officer and utility companies of proposed locations and times for excavation.
 2. Contractor shall be responsible for locating and preventing damage to known utilities. If damage occurs, repair utility at no additional expense to the Government.
 3. If damage occurs to an unknown utility, repair utility. An equitable adjustment will be made in accordance with the Changes clause of the contract.
- C. Nonsmoking Building/Tobacco Use/Vaping: Smoking is not permitted within building or within 25 feet of entrances, operable windows, or outdoor air intakes.

1.7 SPECIAL CONSTRUCTION REQUIREMENTS

- A. Project Website: A project website administered by NPS will be used for purposes of managing communication and documents during construction stage.
1. See Section 01 31 00 "Project Management and Coordination" for requirements on using Project Website.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 11 00

SECTION 01 26 01 – CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section consists of administrative and procedural requirements for contract modifications.

1.2 DEFINITIONS AND ALLOWANCES

- A. Home Office Overhead: Costs incurred in support of all of a contractor's projects and not attributable to a specific job. The cost for home office overhead is only allowed as a percentage of all direct work excluding profit. The following items represent allowable home office overhead costs identified in Part 31 of the Federal Acquisition Regulation (FAR):

1. Rent
2. Utilities
3. Furnishings
4. Office equipment
5. Executive and management staff not exclusively assigned to the project
6. Support, accounting, and administrative staff
7. Preparation of cost proposals, estimating, and schedule analyses connected with Modifications
8. Estimating and preconstruction services
9. Mortgage costs
10. Real estate and corporate taxes
11. Automobile maintenance and travel costs for home office personnel
12. Home office insurances i.e. structure, automotive, umbrella, flood, etc.
13. Depreciation of equipment and other assets
14. Home office supplies (paper, staples, etc.)
15. Legal services
16. Accounting and data processing
17. Professional fees/registration

- B. General Conditions (Field Office Overhead): Management and administrative costs incurred on site for the designated project. Costs associated with preparation of modifications will not be allowed. Costs for these items are to be included only in the general conditions of the modification estimate. Only in the case of a contract time extension are additional general conditions included in modifications. The following items, if applicable, are considered allowable costs for calculating General Conditions:

1. Project Manager (PM), Assistant Project Manager
2. Superintendent, Assistant Superintendent
3. Quality Control, Safety Officer, Environmental Manager, etc.
4. Engineers
5. Travel, lodging, and per diem (as established by Federal Travel Regulations)
6. Scheduling

7. Field Office Trailers and associated temporary utilities
8. Field office supplies
 - a. Mailing and couriers
 - b. Reproduction costs
 - c. Storage
 - d. Phones
 - e. Computers
 - f. Copiers
9. Personal vehicles i.e. Superintendent Pickup trucks

C. General Requirements: Costs directly associated with the project and are necessary to perform the actual work of the modification. These costs shall be shown as direct costs in the estimate. The following items, if applicable, are considered allowable costs for calculating General Requirements:

1. Hoisting
2. Material handling
3. Temporary fencing
4. Port-a-lets
5. Trash removal, dumpsters
6. Barricades
7. Small tools
8. Safety supplies
9. Scaffolding
10. Daily cleaning
11. Traffic control
12. Temporary signage
13. Temporary heating and power

D. Personnel Costs: Costs included in the modification must only be for General Conditions staff and workers actually present and working on project site. Modification costs for salaried workers are only allowed within the structure of a 40-hour week and no overtime or holiday pay will be allowed.

1. Worker Hourly Rates are costs directly associated with the individual worker and consist of the following:
 - a. Base Rate: The hourly rate paid directly to the worker
 - b. Labor Burden: Employer payments of all applicable burdens; includes insurance and taxes the business must pay on behalf of the worker to government entities and educational forums, such as:
 - 1) Social Security
 - 2) Medicare
 - 3) Workers Compensation – Policy and company calculation to be made available.
 - 4) Federal Unemployment Tax Act (FUTA) - Cap Rate and percentage to be proportionally allocated over one year.
 - 5) State Unemployment Tax Act (SUTA) - Cap Rate and percentage to be proportionally allocated over one year.

- 6) Union agreement costs - Other costs required under an enforceable collective bargaining agreement.
- c. Fringe Benefits: Various non-wage compensations provided to employees such as:
 - 1) Health Care Insurance Premiums
 - 2) Cell Phone
 - 3) Clothing
 - 4) 401K and Pensions
 - 5) Vehicle allowances
 - 6) Gas allowance
 - 7) Life insurance premiums
 - 8) Disability insurance
 - 9) Other Fringe Benefits required under an enforceable collective bargaining agreement
- E. Bonuses or Deferred Compensation: No Bonus or Deferred Compensation will be allowed within any components of pricing including Home Office Overhead, General Conditions, General Requirements, Hourly Worker Rates, or the direct costs of work.
- F. General Liability Insurance: An insurance policy that protects Contractor from claims resulting from bodily injury or property damage to a third party. Include as a separate line item within all modification proposals and provide a current insurance quote upon request.
- G. Performance and Payment Bonds: A performance bond is a surety bond issued by an insurance company or bank to guarantee satisfactory completion of a project. The Payment Bond guarantees the Contractor will pay the labor and material costs incurred. Banks and Insurance companies charge a premium for individual project based on a sliding scale related to the size of the project. Include as a separate line item in modification proposals and provide current company bonding rates upon request.
- H. Builder's Risk Insurance: Covers the contractor's loss due to fire, high winds, or other natural forces. Not reimbursed by the National Park Service (NPS) and shall not be included in modification proposals.

1.3 MODIFICATION PROPOSAL PRICING REQUIREMENTS

A. General:

- 1. Proposal be received in the format and within the time frame specified in the Request for Proposal (RFP) letter. Costs or delays resulting from failure of contractor to submit within the time frame specified will not be compensable.
- 2. Proposal shall be detailed with itemized lists of equipment, materials, labor, production rates, overhead, profit, and bond markup for each item. Labor costs must be itemized by craft and hourly rate, including Fringe Benefits and Labor Burden. If the costs of Fringe Benefits and Labor Burden are not itemized, it is assumed they are included in the hourly rate shown, or contractor is not requesting reimbursement. Contractor may utilize the government provided [Contractor Estimate Form](#), or their own form, provided that it contains the same information and level of detail as the Government's form.

3. Requests for extensions of contract time as a result of change must be justified with a Time Impact Analysis (TIA). Refer to Section 01 32 16 "Construction Schedule", for time impact analysis requirements. TIA and associated costs shall be received with the proposal by the date shown within the Request for Proposal letter. Contractor's failure to submit within the specified time frame will be construed as the Contractor waiving right for additional time and no time extension will be allowed.
4. All supporting documentation used to justify the proposed modification will be made available to the Contracting Officer (CO) upon request.
5. Contractor shall review and approve all subcontractor/supplier pricing in detail for proper format, scope, production rates, and pricing prior to submission to NPS. All delay costs associated with not reviewing and approving subcontractor/supplier pricing will be borne by the Contractor.
6. All pricing and production rates within the estimate must be based on fair and reasonable pricing and cannot include built-in contingency.

B. Labor:

1. Contractor shall estimate cost of labor by itemizing each craft involved, indicating worker hourly rate (base rate + labor burden + fringe benefits) for each and itemizing hours required for each craft directly engaged in modification work. Any work proposed requiring overtime work or premium pay shall be itemized separately. Rates shall be in accordance with the Davis-Bacon Act as incorporated herein. Labor Burden may include payroll taxes, Social Security, unemployment insurances, workers compensation insurance, Federal Insurance Contributions Act (FICA), FUTA, and other direct costs resulting from Federal, State or local laws.
2. Itemize labor costs for equipment operators separate from equipment costs.
3. Labor cost for foremen shall only be costs for related work required for the modification.

C. Materials:

1. Estimated cost for materials shall include quotes from multiple sources. Material prices shall include applicable fees and credits, including but not limited to, sales tax, freight and delivery charges, and tax rebates.
2. No markup shall be applied to any material provided by NPS.

D. Equipment:

1. Equipment used for the project must be appropriately sized for work being performed.
2. Do not include costs for "miscellaneous tools and equipment", in your proposal for a replacement value of \$500 or less. Costs shown in excess of \$500 shall be broken out separately.
3. Regardless of ownership, rates to be used in determining equipment rental costs shall be the lowest cost from one of the following sources:
 - a. United States (U.S.) Army Corps of Engineers, Ownership and Operating Expense Schedule (use latest edition and applicable region)
 - b. Construction Blue Book
 - c. Local equipment rental rates, documented by actual invoice charges, or itemized vendor quotes.

4. Estimated equipment rates shall include operating costs of all fuel, oil, lubrication, supplies, small tools, necessary attachments, ground engaging components, tires and tracks, routine repairs and maintenance (cost of major repair and overhaul is not allowed per Federal Acquisition Regulation (FAR) 31.105(d)(2)), depreciation, storage, insurance, and all incidentals. Mobilization, if applicable, may be included for equipment solely used on the modification work but must be listed separately.
5. Estimate full rate for equipment only for duration that equipment will be utilized to accomplish work of the modification.
6. Standby unit rates used in accordance with paragraph 1.3, D, 2, above. If the U.S. Army Corp of Engineers is utilized then their standby rates prevail. If Bluebook or local equipment pricing is accepted, then 1/2 of equipment costs minus any operating costs, major repair and overhaul will be accepted.
7. If equipment is in standby mode due solely to a documented NPS delay, established standby rate shall apply from the first day of the delay.
8. Equipment not used and on job site for up to five consecutive days may be classified at standby rates, provided the equipment is or has been used solely to perform work on the modification and will be necessary to complete additional modification work. Equipment still on the jobsite but not in use after five consecutive days will not be considered in the modification pricing.
9. Requests for compensation for equipment stand by time must be justified, documented and itemized separately.
10. The estimated timeframe (daily, weekly, monthly) for use of the equipment must reflect the lowest cost to the Government.

E. Establishment and Application of Overhead and Profit Percentages:

1. Home Office Overhead and Profit (OH&P) shall be applied to direct costs only. Profit shall not be applied to overhead amounts; and overhead shall not be applied to profit. Home office overhead shall contain only allowable, allocable, and reasonable costs per the contract documents and FAR Part 31. Profit percentages are based on risk factors found in FAR Part 31 which have been applied to the specific type of work included in this project. Negotiated rates shall not exceed the following percentages for OH&P for contractor self-performed work:

Overhead.....	10%
Profit.....	7.0%
2. Total aggregate limit of markup (OH&P) for Contractor and Subcontractors on modification work shall not exceed 25%. The NPS will not be responsible for allocation of percentages between contractor and subcontractors at any tier.
3. If Contractors form a partnership, partnership may only receive home office overhead and profit in same amount as an individual Contractor (refer to paragraph 1.3,E,1 above). It is the responsibility of the partners to decide on division of revenue.
4. Combined Increases and Decreases: On proposals involving both increases and decreases in the Contract Price, overhead and profit mark-ups are required on net increases and deducted on net decreases.
5. At no time can profit be calculated on Overhead or itself, it must be calculated on direct costs of work only.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 012601

SECTION 01 27 00 – DEFINITION OF CONTRACT LINE ITEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section explains in general, what is and is not included in a contract line item, and limits or cut-off points where one item ends and another begins.
- B. If no contract line item exists for a portion of work, include costs in a related item.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF CONTRACT LINE ITEMS

- A. Contract Line Item Number 0001a - Exterior coating - remove, repair masonry, and recoat
 - 1. This item consists of removing the current exterior coating on the exterior masonry and recoating the exterior masonry with the mineral coating. CLIN 0001b – 0001d will occur after the coating is removed and before the new coating is applied
 - 2. Measurement for payment will be in percent complete.
 - 3. Payment will be made at the contract lump sum price.
- B. Contract Line Item Number 0001b – Exterior Masonry Repointing
 - 1. This item consists of exterior masonry repointing.
 - 2. Measurement for payment will be in percent complete.
 - 3. Payment will be made at the contract lump sum price.
 - 4. Payment for variations in quantities above or below this ESTIMATED quantity shall be in accordance with FAR Clause 52.211-18.
- C. Contract Line Item Number 0001c – Exterior Incompatible Mortar Replacement
 - 1. This item consists of incompatible exterior mortar removal and replacement.
 - 2. Measurement for payment will be in percent complete.
 - 3. Payment will be made at the contract lump sum price.
 - 4. Payment for variations in quantities above or below this ESTIMATED quantity shall be in accordance with FAR Clause 52.211-18.
- D. Contract Line Item Number 0001d – Exterior Brick Masonry Replacement
 - 1. This item consists of exterior brick masonry removal and replacement.
 - 2. Measurement for payment will be in percent complete.
 - 3. Payment will be made at the contract lump sum price.

4. Payment for variations in quantities above or below this quantity shall be in accordance with FAR Clause 52.211-18.
- E. Contract Line Item Number 0002 – Exterior Door Replacement
1. This item consists of removing existing exterior metal doors and frames and the adjacent concrete to the masonry opening. These openings will then be cleaned and new wood doors and stainless steel hardware into the two existing openings
 2. Measurement for payment will be in percent complete.
 3. Payment will be made at the contract lump sum price
- F. Contract Line Item Number 0003 – Exterior Window Replacement
1. This item consists of removing the 10 existing exterior wood windows and wood sills, preparing the opening, and installing new wood windows and sills.
 2. Measurement for payment will be in percent complete.
 3. Payment will be made at the contract lump sum price
- G. Contract Line Item Number 0004 – Remove Lantern and Construct Structural Cap
1. This item consists of removing the cast iron lantern and masonry down to the tension ring (as delineated on the drawing set). These materials will be measured, drawn, and cataloged for future use. A wooden cap with metal roofing will be then constructed to keep water out of the masonry cone. The materials removed from the lighthouse will be transported off site and stored at an NPS facility until needed. Metals at this level have known lead based paint. This line item includes an aluminum louver at the highest level with a ventilation fan routed to existing electrical.
 - a. This work shall not be performed prior to completion of CLIN 0001
 - b. This work shall be completed prior to performing work required for CLIN 0010
 2. Measurement for payment will be in percent complete.
 3. Payment will be made at the contract lump sum
- H. Contract Line Item Number 0005 – NOT USED
- I. Contract Line Item Number 0006 – NOT USED
- J. Contract Line Item Number 0007 – NOT USED

K. Contract Line Item Number 0009a – Clean Interior Brick & Wood Walls

1. This item consists of cleaning the interior masonry and mortar, wood wall cleaning & coating.
2. Measurement for payment will be in percent complete.
3. Payment will be made at the contract lump sum price.

L. Contract Line Item Number 0009b –Interior Masonry Repointing

1. This item consists of interior masonry repointing.
2. Measurement for payment will be in percent complete.
3. Payment will be made at the contract lump sum price.
4. Payment for variations in quantities above or below this quantity shall be in accordance with FAR Clause 52.211-18.

M. Contract Line Item Number 0009c –Interior Incompatible Mortar Replacement

1. This item consists of incompatible interior mortar removal and replacement.
2. Measurement for payment will be in percent complete.
3. Payment will be made at the contract lump sum price.
4. Payment for variations in quantities above or below this quantity shall be in accordance with FAR Clause 52.211-18.

L. Contract Line Item Number 0009d –Interior Brick Masonry Replacement

1. This item consists of interior brick masonry removal and replacement.
2. Measurement for payment will be in percent complete.
3. Payment will be made at the contract lump sum price with
4. Payment for variations in quantities above or below this quantity shall be in accordance with FAR Clause 52.211-18.

M. Bid Option 1, Contract Line Item Number 0008 – Cast Iron Stairs, Landings, Center Column, and Handrails

1. This item consists of repairing and coating interior cast iron stairs, cast iron landings, wood landings, cast iron handrails and cast iron column. This effort will include selective demolition of adjacent masonry (mortar above stairs and landings), prepping all cast iron for new coatings, casting new cast iron to replace damaged pieces, and coating all cast iron. Metals here have lead based paint.
2. Measurement for payment will be in percent complete.
3. Payment will be made at the contract lump sum price.

N. Bid Option 2, Contract Line Item number 0010 - Repair and Replace Cast Iron Lantern and Masonry.

1. This item consists of utilizing the materials and drawings noted in contract line item 0004. This effort will consist of recasting the removed cast iron, utilizing the drawings made in the removal process. These pieces will then be coated, and installed at the lighthouse. This effort will include rebuilding the masonry level that was previously taken down and salvaged. This includes drilling for and installing the threaded rod tie downs.
 - a. The work for this line item shall not be performed prior to completion of work for CLIN 0004.

2. Measurement for payment will be in percent complete
3. Payment will be made at the contract lump sum price.

O. Bid Option 3, Contract Line Item Number 0011 – Electrical Work

1. This item consists of removing existing electrical conduit, light fixtures, and replacing with new conduit, wire, and fixtures. Wiring that has been done to supplement other work
 - a. This work for this line item must be constructed with CLIN 0010 (electrical required to hook up vent fans)
2. Measurement for payment will be in percent complete.
3. Payment will be made at the contract lump sum price.

P. Bid Option 4, Contract Line Item Number 0012 – Mechanical Work

1. This item consists of installing new mechanical vent fans at the upper levels, inside of the new copper vents as being constructed and installed in CLIN 0010
 - a. This work for this line item must be constructed with CLIN 0010 & 0011
2. Measurement for payment will be in percent complete.
3. Payment will be made at the contract lump sum price

END OF SECTION 01 27 00

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Definitions
 - 2. Construction Coordination
 - 3. Submittals
 - 4. Coordination Drawings
 - 5. Requests for Information (RFIs)
 - 6. NPS/DSC Project Website
 - 7. Project Meetings
 - 8. Environmental Coordination
 - 9. Permits
- B. Related Requirements:
 - 1. Section 01 32 16 "Construction Schedule" for preparing and submitting Contractor's construction schedule.
 - 2. Section 01 73 40 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Section 01 77 00 "Closeout Procedures" for coordinating closeout of the Contract.
 - 4. Section 01 91 14 "Total Building Commissioning" for coordinating the work with Owner's Commissioning Authority.

1.2 DEFINITIONS

- A. [Agency with Jurisdiction](#)
- B. [Construction Permits – Contractor Provided](#)
- C. [Government Furnished Permits](#)

1.3 CONSTRUCTION COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, which depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain 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 with other Contractors to ensure maximum accessibility for required maintenance, service, and repair.

3. Make provisions to accommodate items scheduled for later installation.
 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of components, including mechanical and electrical.
 5. Properly plan construction operations to include permit requirements. Allow enough time to execute permit provisions to maintain work schedule, site visits, inspections, and reporting deadlines.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to:
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. Permit requirements
 7. Pre-installation conferences
 8. Project closeout activities
 9. Commissioning activities

1.4 SUBMITTALS

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of Contract Documents or standard printed data. Include following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate dimensions shown on Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Contracting Officer (CO) for resolution of such conflicts.
 - c. Indicate space requirements for routine maintenance and anticipated replacement of components during the life of the installation.
 - d. Show location and size of access doors required for access to concealed dampers, valves, and controls.
 - e. Indicate required installation sequences.
 2. Sheet Size: At least 8-1/2 by 11 inches (215 by 280 millimeters) but no larger than 30 by 40 inches (750 by 1000 millimeters).

3. Number of Copies: Submit two opaque copies of each submittal & PDF copy. Contracting Officer will return one copy.
4. Refer to individual Sections for Coordination Drawing requirements for Work in those Section

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural, structural, mechanical, plumbing, fire-protection, fire-alarm, and electrical elements. 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 sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures 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:
 - 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:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches (32 millimeters) 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. Review: Contracting Officer will review coordination drawings to confirm Work is being coordinated; details of coordination are Contractor's responsibility. If Contracting Officer determines coordination drawings are not prepared in scope or detail, or are otherwise deficient, Contracting Officer will inform Contractor, who shall make changes and resubmit.
9. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 33 23 "Submittal Procedures."

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

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 Portable Document Format (PDF) file format.
 3. Contracting Officer will furnish Contractor one set of digital data files (AutoCad.dwg) of Drawings for use in preparing coordination digital data files.
 - a. Contracting Officer makes no representations as to accuracy or completeness of digital data files as they relate to Drawings.
 - b. Digital Data Software Program: Drawings are available in AutoCad.dwg.
- D. Division 1 documents: The following items shall be submitted a minimum of one week prior to Preconstruction Conference. Contracting Officer will notify Contractor of tentative date for Pre-Construction Conference.
1. Letter designating Project Superintendent
 2. Construction Schedule
 3. A Comprehensive Schedule of Values
 4. Accident Prevention Plan
 5. A List of Subcontractors for this project
 6. Written statements from Subcontractors certifying compliance with applicable labor standard clauses.
 7. Certificates of Insurance or SF1413 for Contactor and all Subcontractors
 8. Waste Management Plan
 9. Quality Control Plan
 10. Temporary Storm Water Pollution Prevention Plan (SWPP or UPPP)
 11. Indoor Air Quality (IAQ) Management Plan
 12. Contractors Commissioning Plan
 13. Historic Preservation Treatment Plan (HPTP)
 14. List of Required Construction Permits (If applicable). Include the following information for each permit:
 - a. Name of Permit
 - b. Agency(ies) with Jurisdiction issuing the permit
 - c. Information required from Government to complete permit application
- E. Provide items listed to Contracting Officer before Pre-Construction Conference. If all documents have not been received one week prior to scheduled Pre-Construction Conference date, conference may be cancelled, Notice to Proceed may not be issued, and Contracting Officer will consider other contractual remedies. Work shall not commence until written Notice to Proceed has been issued.

1.5 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of Contract Documents, Contractor shall prepare and submit an RFI utilizing form created on NPS/DSC management software-website.
1. Contracting Officer will not respond to RFIs submitted by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner to avoid delays in the work.

- B. Content of RFI: Include detailed, legible description of item needing information or interpretation and the following:
1. RFI number, numbered sequentially
 2. Date
 3. RFI subject
 4. Specification Section number and title and related paragraphs, as appropriate.
 5. Drawing number and detail references, as appropriate.
 6. Field dimensions and conditions, as appropriate.
 7. Contractor's suggested resolution: If Contractor's suggested resolution impacts Contract Time or Contract Sum, Contractor shall state impact in RFI.
 8. Contractor's signature
 9. Requested date for response
 10. 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 Form: Complete RFI Form on NPS/DSC Project Website as follows:
1. Enter general information at the top of the form.
 2. Under the "Action" section at the bottom of the form, select "Question" then select "CMR" in drop-down of "Send to" box.
 3. Enter details of question and attach related documents.
 4. Select "Submit Form" at bottom of page.
- D. Contracting Officer's Action: Contracting Officer will review each RFI, determine action required, and respond. Contracting Officer will determine critical nature of each RFI and issue response accordingly.
1. The following are not considered to be RFIs and will receive no 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 Contract Documents.
 - e. Requests for adjustments in Contract Time or Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Contracting Officer's action may include a request for additional information; time for response will date from time of receipt of additional information.
 3. Contracting Officer's action on RFIs may result in need for a change to Contract Time or Contract Sum. All contract changes will be processed following terms and conditions of contract.

1.6 PROJECT WEB SITE

- A. Use NPS/DSC management software website for communication throughout contract period on:
 - 1. Project directory
 - 2. Project correspondence
 - 3. Meeting agendas and minutes
 - 4. Contract modifications forms and logs
 - 5. RFI form and processing
 - 6. Task and issue management
 - 7. Photo documentation
 - 8. Baseline schedule, schedule updates and calendar management
 - 9. Submittal form and processing
 - 10. Payment coordination documentation
 - 11. Drawing and specification document hosting, viewing, and updating
 - 12. Online document collaboration
 - 13. Reminder and tracking functions
 - 14. Archiving functions
 - 15. Notification of submittal and RFI statuses and current responsible party
 - 16. Permits and addendums
- B. Some documents are not suitable to be shared using the NPS/DSC management software website. Documents containing Personal Identifying Information (PII) (i.e. certified payrolls) shall not be shared using NPS/DSC management software website and shall be coordinated with Project team as appropriate.
- C. Submit to Contracting Officer a list of employees who will need access to the website. Users will receive an invitation to register from Department of Interior (DOI). Once registered on DOI website, user will be given access to NPS/DSC management software website.

1.7 PROJECT MEETINGS

- A. Preconstruction Conference: Before start of construction, Contracting Officer will arrange an on-site meeting with Contractor. Meeting agenda will include the following as a minimum:
 - 1. Roles & Responsibilities / Lines of Authority
 - 2. Park rules and regulations
 - 3. Jobsite Safety
 - 4. Resolution of comments on required Division 1 documents
 - 5. Coordination of Subcontractors
 - 6. Labor law application
 - 7. Modifications
 - 8. Payments to Contractor
 - 9. Payroll reports
 - 10. Contract time
 - 11. Liquidated damages
 - 12. Contractor Performance Evaluation
 - 13. Display of Hotline posters
 - 14. Notice to proceed
 - 15. Correspondence procedures

16. NPS/DSC Project website
17. Acceptance/rejection of work
18. Progress meetings
19. Submittal procedures
20. NPS Final Accessibility Inspection
21. Environmental requirements
22. Permit requirements
23. As-constructed drawings/operation and maintenance (O&M) manuals.
24. Saturday, Sunday, holiday and night work.
25. Reference materials
26. Value engineering
27. Schedule of Values

B. Progress Meetings: Contracting Officer will schedule weekly meetings with Contractor.

1. Attendees: In addition to Government Representatives, each Contractor, Subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented. Participants at meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Meeting agenda will include:
 - a. Approval of minutes of previous meetings
 - b. Submittal status
 - c. Review of off-site fabrication and delivery schedules.
 - d. Requests for information (RFI) and other issues.
 - e. Modifications
 - f. Work in progress and projected.
 - 1) Status of required inspections (Special Inspections, Accessibility, etc.)
 - g. Inspections of work in progress and projected (Special inspections, Accessibility, etc.)
 - h. Construction Schedule update (provide updated Critical Path Method (CPM)).
 - i. Status of Project Record Drawings and O&M manuals.
 - j. Other business relating to work.
 - k. Permit requirements

C. Preinstallation Conferences: Conduct at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend meeting. Advise Contracting Officer of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for particular activity under consideration, including requirements for:
 - a. Contract Documents
 - b. Options
 - c. Related RFIs
 - d. Related Change Orders

- e. Purchases
 - f. Deliveries
 - g. Submittals
 - h. Review of mockups
 - i. Possible conflicts
 - j. Compatibility requirements
 - k. Time schedules
 - l. Weather limitations
 - m. Manufacturer's written instructions
 - n. Warranty requirements
 - o. Compatibility of materials
 - p. Acceptability of substrates
 - q. Temporary facilities and controls
 - r. Space and access limitations
 - s. Regulations of agency(ies) with jurisdiction
 - t. Testing and inspecting requirements
 - u. Installation procedures
 - v. Coordination with other work
 - w. Required performance results
 - x. Protection of adjacent work
 - y. Protection of construction and personnel
- 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Reporting: Distribute minutes of meeting to each party present and to other parties requiring information.
 - 5. Do not proceed with installation if conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene conference at earliest feasible date.

1.8 ENVIRONMENTAL COORDINATION

- A. Contractor's Environmental Manager: Designate on-site party responsible for overseeing Contractor's conformance to environmental goals for project and implementing procedures for environmental protection.
 - 1. Qualifications: Minimum 3 years Construction experience on projects of similar size and scope; with environmental procedures similar to this project; familiar with environmental regulations applicable to construction operations.
 - 2. Responsibilities: Responsibilities shall include:
 - a. Compliance with applicable Federal, State, and local environmental regulations, including maintaining required documentation.
 - b. Implementation of Waste Management Plan (WMP).
 - c. Implementation of Indoor Air Quality (IAQ) Management Plan.
 - d. Implementation of Storm Water Pollution Prevention Plan (SWPPP).
 - e. Present overview of environmental issues and summarize site specific procedures relating to management plans at Preconstruction conference.
 - f. Training for Contractor personnel in accordance with position requirements.
 - g. Monitoring and documentation of environmental procedures.

- B. Perform project quality control in accordance with requirements specified in Related Sections, including:
 - 1. Quality Requirements
 - 2. Regulatory Requirements
 - 3. Indoor Air Quality (IAQ) Management
 - 4. Noise and Acoustics Management
 - 5. Temporary Storm Water Pollution Prevention Environmental Management
 - 6. Construction Waste Management
- C. Contractor's Environmental Training Program: Contractor shall provide environmental training for workers performing work on project site. Training shall include:
 - 1. Overview of environmental issues related to building industry.
 - 2. Overview of environmental issues related to Project.
 - 3. Review of site-specific procedures and management plans:
 - a. Construction Waste Management
 - b. Indoor Air Quality (IAQ) Management
 - c. Noise and Acoustics Management
 - d. Temporary Storm Water Pollution Prevention
 - 4. Pollution Prevention (P2) practices: Submit evidence of familiarity with P2 Practices.
 - 5. Compliance with environmental regulations: As specified in Regulatory Requirements. Submit Contractor 40 CFR (Code of Federal Regulations) employee training records upon request of Contracting Officer.
- D. Provide documentation for environmental procedures as specified herein and in accordance with approved Waste Management Plan, IAQ Management Plan, and Storm Water Pollution Prevention Plan.

1.9 PERMITS

- A. General:
 - 1. Permits and Responsibilities: Contractor shall, without additional expense to the Government, be responsible for obtaining necessary licenses and permits, and for complying with Federal, State and municipal laws, codes, and regulations applicable to the performance of the work. Contractor shall also be responsible for damages to persons or property that occur as a result of Contractor's fault or negligence; and for materials delivered and work performed until completion and acceptance of the work.
 - 2. For the purpose of this contract, Contractor will not be considered an agent of the Government. Contractor shall comply with appropriate Federal, State and local laws.
- B. Government Furnished Permits: During development of the project's design, permits listed below were negotiated and agreed to by the Government. Terms and provisions of these permits shall be adhered to for the duration specified in each permit.
- C. Potential Permits: Permits listed below were identified during the design process as likely to be required based on typical means and methods of construction. The list is provided to assist

Contractor in determining which permits will be required for contract's chosen means and methods. The list shall not be considered complete; it is the Contractors' responsibility to determine means and methods and obtain required permits. Contractor shall obtain all permits required to legally conduct work.

D. Coordination with Agency(ies) with Jurisdiction Issuing Permits

1. Coordination: Contact the Agency(ies) with Jurisdiction as needed and sufficiently in advance to avoid delaying work: Coordinate meetings, reporting requirements, inspections, and other requirements.

E. Administrative Procedures:

1. Coordinate scheduling and timing of required administrative provisions of project permits with Agency(ies) with Jurisdiction, Construction Manager, and Park to avoid conflicts.
2. Supply needed information to Agency(ies) with Jurisdiction issuing permits, pay fees required and provide material needed to comply with permit's conditions and provisions.
3. Upload permits to NPS/DSC management software website when permits are obtained.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 32 16 – CONSTRUCTION SCHEDULE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section consists of Construction Schedule requirements including:
 - 1. Schedule of Values
 - 2. Construction Schedule Requirements.
 - 3. Construction Schedule Updates.
 - 4. Time Impact Analysis.
- B. Purpose: The Construction Schedule ensures adequate planning, coordination, scheduling, and reporting during execution of the work by the Contractor. It shall assist the Contractor and Contracting Officer (CO) in monitoring the progress of the work, evaluating proposed changes, and processing Contractor's monthly progress payments. It shall include the dates in the contract, phases, milestones, occupancies, holidays, weather consideration, a critical path, and the requirements of this section.

1.2 DEFINITIONS

- A. Activity: A discrete part of a project identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical activities are activities on the critical path. They 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: Allocation of the Schedule of Values for completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by the Contracting Officer.
- C. Critical Path Method (CPM): 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: Longest connected chain of interdependent activities through the network schedule that establishes minimum overall Project duration and contains no float.
- E. Float: Measure of leeway in starting and completing an activity.
 - 1. Float: Not for the exclusive use or benefit of the Government or Contractor but is jointly owned.
 - 2. Free Float: Amount of time an activity can be delayed without adversely affecting the early start of the successor activity.

- 3. Total Float: Measure of leeway in starting or completing an activity without adversely affecting planned Project completion date.
- F. Resource Loading: Allocation of manpower and equipment necessary for completion of an activity as scheduled.
- G. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

1.3 SUBMITTALS

- A. Electronic Copies: Schedules and reports submitted shall be posted on the NPS/DSC management software website in native electronic file formats. The intent of the Government is to limit the number of printed reports to those determined by the project team as essential.
- B. Schedule of Values: After contract award and before Pre-Construction conference, submit schedule of dollar values based on Contract Price Schedule.
- C. Construction Baseline Schedule: After contract award and before Pre-Construction conference, submit **two** paper copies of baseline schedule, large enough to show entire schedule for entire construction period. Utilize Schedule of Values in preparation of Construction Baseline Schedule.
- D. Critical Path Method (CPM) Reports: Concurrent with CPM schedule, submit **three** paper copies of the following computer-generated reports. For each activity, include 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 predecessor and successor tasks for activities sorted in ascending order by activity number and then early start date, or actual start date if known.
 - 3. Total Float Report: List of activities sorted in ascending order of total float.
- E. Construction Schedule Updates: On or before 7th day preceding progress payment request date, submit estimates of percent completion of each schedule activity and necessary supporting data. Provide two paper copies.
- F. Construction Schedule Revisions and Time Impact Analysis: For each Construction Schedule revision, submit **two** paper copies of a Time Impact Analysis. Incorporate a Fragmentary Network (Fragnet) into currently accepted Construction Schedule that demonstrating how Contractor proposes to incorporate a modification, change, delay, or Contractor request.

1.4 QUALITY ASSURANCE

- A. Contractor shall meet with Contracting Officer on day of the preconstruction conference to go over:
 - 1. Review software limitations, 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
4. Review delivery dates for Government-furnished products.
5. Review schedule for work of separate Government contracts.
6. Review time required for review of submittals and re-submittals.
7. Review requirements for tests and inspections by independent testing and inspecting agencies.
8. Review time required for completion and startup procedures.
9. Review time required for obtaining and activating permits.
10. Review and finalize list of construction activities to be included in schedule.
11. Review baseline schedule comments, resolve issues and progress on incorporating them
12. Review procedures for updating schedule.
13. Discuss reporting requirements and establish protocol for naming and transmitting electronic schedules.

- B. Contractor's Schedule Representative: Before the preconstruction conference, designate an authorized representative to be responsible for preparing and maintaining the Construction Schedule. Submit resume outlining qualifications of Scheduler to Contracting Officer for acceptance. Scheduler shall have prepared and maintained at least 5 previous schedules of similar size and complexity similar to this Contract, demonstrating proficiency of using scheduling software. Authorized representative will be responsible for preparing the Baseline Schedule, required updates, revisions, Time Impact Analyses, and reports.

1.5 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate Contractors.
- B. Coordinate Construction Baseline Schedule with Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
 1. In developing Construction Baseline Schedule, ensure Subcontractor's work at all tiers, and prime Contractor's work, is included and coordinated.
 2. Secure time commitments for performing critical elements of work from parties involved.
 3. Coordinate each construction activity in network with other activities and schedule in proper sequence.

PART 2 - PRODUCTS

2.1 SCHEDULE OF VALUES

- A. Breakdown each lump-sum item into component work activities used in the schedule for which progress payments may be requested. Work activities broken out within schedule of values shall be integrated into and made a logical part of the construction baseline schedule. Total costs for the component work activities shall equal contract price for that lump-sum item. Contracting Officer may request data to verify accuracy of dollar values. Include mobilization, general condition costs, overhead and profit in the total dollar value of unit price items and in the

component work activities for each lump-sum item. Do not include mobilization, general condition costs, overhead or profit as a separate item.

- B. Do not break down unit price items. Use only the contract price for unit price items.
- C. Total cost of all items shall equal the contract price. The Schedule of Values will form the basis for progress payments and the Construction Schedule.

2.2 CONSTRUCTION SCHEDULE REQUIREMENTS

- A. Construction Baseline Schedule: Prepare Construction Baseline Schedule using a computerized, cost and resource-based, time-scaled Critical Path Method network analysis diagram for the Work.
 - 1. Develop and finalize Construction Baseline Schedule so it can be accepted for use no later than **30** days after date established for the Notice of Award.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing work within applicable completion dates, regardless of Government's acceptance of schedule.
 - 2. Establish procedures for monitoring and updating Construction Baseline Schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
- B. Construction Baseline Schedule Preparation: Prepare a list of all activities required to complete the Work. Using preliminary Critical Path Method network diagram, prepare a skeleton network to identify probable critical paths.
 - 1. Activities: Indicate estimated duration, sequence requirements, and relationship of each activity in relation to other activities.
 - a. Activities shall include all base contract line items, as well as any selected bid options as noted on the Contract Line Items.
 - 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 Critical Path Method schedule within the limitations of the Contract Time.
 - 4. Show sequence and interdependence of activities required for completion of work. Ensure work sequences are logical and Construction Baseline Schedule shows a coordinated plan of the work.
 - 5. Resource loading of each activity shall include personnel by labor category and equipment type and capacity proposed to complete the activity in duration shown.
 - 6. Consider seasonal weather conditions in planning and scheduling work influenced by high and low ambient temperatures, wind, hurricanes or other named storms, or precipitation to ensure completion of work within contract time.
 - 7. Time Frame: Proposed duration assigned to each activity shall be Contractor's best estimate of time required to complete activity considering the scope and resources planned for activity.

- a. An early finish date may be shown but the late finish date shall be same date as last day of contract period. An early completion schedule shall contain:
 - 1) Insert an activity titled "Project Float" as a successor to last activity in early project completion schedule network.
 - 2) Add a milestone titled "Contract End Date" as a successor to the activity "Project Float".
 - 3) Add duration to the activity "Project Float" as required so the milestone "Contract End Date" equals the last day of Contract Period.
- b. Contract completion date shall not be changed by submission of a schedule that shows an early completion date.
- c. Contractor shall limit use of lead or lag duration's between schedule activities.
- d. Project Calendars: Develop and incorporate the following calendars:
 - 1) Administrative Calendar: Include calendar based on a 7-day week to be used on activities based on calendar days. Apply this calendar to administrative tasks or other tasks not affected by non-working days (Federal Holidays, weather, etc.).
 - 2) Project Calendar: Include calendar based on planned work week for the project. Include Federal Holidays, weekends, and non-workdays indicated in contract documents. Apply this calendar to activities not anticipated to be affected by weather. Be clear when identifying number of work days in work week.
 - 3) Weather Calendar: Utilize Project Calendar and show anticipated normal downtime related to weather as non-working time. Weather days shall be based on data for local area from a reliable source like the National Oceanic and Atmospheric Administration (NOAA), National Park Service records, or source acceptable to Contracting Officer. Apply this calendar to activities anticipated to be affected by weather.
 - a) If any named storms impact the project and project site, discuss with Contracting Officer on how to address in project scheduling & anticipated weather days
 - b) As the site is on a remote island, weather days may include any days in which it has been deemed unsafe to cross the sound by ferry
- e. Activity Duration: Define so no activity is longer than **14** days, except for non-construction activities including mobilization, shop drawings and submittals, fabrication and delivery of materials and equipment.
- f. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 calendar days, as separate activities in the schedule. Procurement cycle activities can include submittals, approvals, purchasing, fabrication, and delivery.
 - 1) Replacement Cast Iron pieces (Lantern Level)
 - 2) Replacement historically accurate Bricks
- g. Submittal Review Time: Include review and re-submittal times indicated. Coordinate submittal review times in Construction Baseline Schedule.
- h. Startup and Testing Time: Include not less than 5 days for startup and testing.

- i. Substantial Completion: Allow time for Government administrative procedures necessary for certification of Substantial Completion. (For more information, refer to Specification 01 77 00 "Closeout Procedures.")
- 8. Constraints: Include constraints and work restrictions indicated in Contract Documents and as follows in schedule and show how the sequence of Work is affected.
 - a. Phasing: Arrange list of activities on schedule by phase.
 - b. Work under More Than One Contract: Include a separate activity for each contract.
 - c. Work Restrictions: Show effect of the following on the schedule:
 - 1) Coordination with existing construction
 - 2) Limitations of continued occupancies
 - 3) Uninterruptible services
 - 4) Use of premises restrictions
 - 5) Provisions for future construction
 - 6) Seasonal variations
 - 7) Environmental control
 - 8) Permit provisions
 - d. Work Stages: Indicate important stages of construction for each major portion of the Work.
 - 1) Subcontract awards
 - 2) Submittals
 - 3) Purchases
 - 4) Mockups
 - 5) Fabrication
 - 6) Sample testing
 - 7) Deliveries
 - 8) Installation
 - 9) Tests and inspections
 - 10) Adjusting
 - 11) Curing
 - 12) Building flush-out.
- 9. Milestones: Include milestones indicated in Contract Documents in schedule, including, but not limited to, Notice to Proceed, Substantial Completion.

C. Joint Review, Revision, and Acceptance:

- 1. Within seven calendar days of receiving Contractor's proposed Construction Baseline Schedule, Contracting Officer shall review initial Construction Baseline Schedule.
- 2. Within seven calendar days after review, Contractor shall revise and resubmit Construction Baseline Schedule in accordance with comments presented from review.
- 3. In the event the Contractor fails to define any element of work, activity, or logic, and the Contracting Officer review does not detect this omission or error, such omission or error, when discovered by Contractor or Contracting Officer, shall be corrected by Contractor within seven calendar days and shall not affect contract period.
- 4. Upon acceptance of the Construction Baseline Schedule, Contracting Officer saves schedule as a baseline and updates on a monthly basis. Construction schedule update will

be used to evaluate Contractor's monthly applications for payment based upon information developed at monthly Construction Schedule update meeting.

- D. Cost Correlation: In the heading of the schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of Work performed as of dates used to prepare payment requests.
 - 1. Contractor shall assign cost to construction activities on Construction Baseline Schedule. Costs shall not be assigned to submittal activities unless specified otherwise but may, with Contracting Officer's approval, be assigned to fabrication and delivery activities. Costs shall be included for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training (if applicable).
 - 2. Each activity cost shall reflect an accurate value based on the Contract Price Schedule.
 - 3. Total cost assigned to activities shall equal total Contract Price.
- E. Recovery Schedule: When periodic schedule update indicates Work is **14** or more calendar days behind current accepted schedule, a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule shall also be submitted. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery shall be accomplished.
- F. Computer Software: Prepare schedules using a program developed specifically to manage construction schedules.
 - ~~1.~~ Use Microsoft Project or Primavera, for Windows 10 or newer.

PART 3 - EXECUTION

3.1 CONSTRUCTION SCHEDULE UPDATES

- A. Progress Meeting Updates: Provide a **3** week look-ahead schedule, derived from the currently accepted schedule, before each weekly progress meeting. Utilize look-ahead schedule to facilitate and take notes on discussions held during progress meeting.
- B. Monthly Schedule Updates:
 - 1. General: Update Construction Schedule on monthly basis to reflect construction progress and activities throughout entire contract period and until project substantial completion. The status date of each schedule update shall be the 7th day preceding the progress payment request date.
 - 2. Procedure: Contractor shall meet with Contracting Officer each month at Construction Schedule update meeting to review progress made through the status date of the Construction Schedule update, including dates activities were started or completed and percentage of work completed on each activity started or completed.
 - 3. Reports: Concurrent schedule revisions, prepare tabulated reports showing:
 - a. Identification of activities that have changed
 - b. Changes in early and late start dates

- c. Changes in early and late finish dates
 - d. Changes in activity durations in workdays
 - e. Changes in the critical path
 - f. Changes in total float or slack time
 - g. Changes in the Contract Time
 - 4. Narrative: Report shall include a brief description of actual progress made during update period; actual and potential delaying activities; impediments to progress; issues related to inclement weather; progress toward established milestones and project float. Report shall include a brief description of work anticipated to be performed in the next month. Minor revisions to the schedule should be identified for evaluation and acceptance or rejection.
 - 5. As Work progresses, indicate Actual Completion percentage for each activity.
 - 6. If schedule update shows a late finish date after contract completion date, include:
 - a. Known delays
 - b. Actions to get back on schedule
 - c. Pending modifications
 - d. Impediments or constraints affecting progress
 - 7. Progress Payments: Monthly updating of the currently accepted Construction Schedule shall be an integral part of the process upon which progress payments will be made. If Contractor fails to provide schedule updates or revisions, a portion of the monthly payment may be retained until corrections have been made.
- C. Distribution: Distribute copies of accepted schedule to Contracting Officer, Contracting Officers Representative, Construction Management Representative, Subcontractors, 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 same parties and post in same locations. Delete parties from distribution when they have completed their assigned portion of the Work.
- D. Construction Schedule Revisions:
- 1. Required Revisions: If, as a result of the monthly schedule update, it appears the currently accepted Construction Schedule no longer represents actual prosecution and progress of the work, Contracting Officer will request, and Contractor shall submit, a revision to the Construction Schedule. Contractor may also request reasonable revisions to currently accepted Construction Schedule in event the Contractor's planning for the work is revised. If Contractor desires to make changes, Contractor shall notify Contracting Officer in writing, stating reason for proposed revision. Accepted revisions shall be incorporated into currently accepted Construction Schedule for next monthly schedule update.
 - 2. Procedure: If revision to currently accepted Construction Schedule is contemplated, Contractor or Contracting Officer shall advise the other in writing at least seven calendar days prior to next monthly schedule update meeting, describing revision and reasons for the revision. Government-requested revisions will be presented in writing to the Contractor, who shall respond in writing within seven calendar days.
 - 3. Reports: Concurrent with making revisions to schedule, prepare tabulated reports showing:
 - a. Identification of activities changed

- b. Changes in early and late start dates
- c. Changes in early and late finish dates
- d. Changes in activity durations in workdays
- e. Changes in critical path
- f. Changes in total float or slack time

3.2 TIME IMPACT ANALYSIS FOR CONTRACT MODIFICATIONS CHANGES DELAYS AND CONTRACTOR REQUESTS:

1. Requirements: When contract modifications or changes are initiated, delays experienced, or Contractor desires to revise currently accepted Construction Schedule, Contractor shall submit to Contracting Officer a written time impact analysis illustrating the influence of modification, change, delay, or Contractor request on contract time.
2. Time Extensions: Activity delays, resulting in a late completion date projection, shall not automatically mean an extension of contract time is warranted or due to Contractor. It is possible a modification, change, or delay will not affect existing critical path activities or cause non-critical activities to become critical. A modification, change, or delay may result in absorbing a part of available total float that may exist within an activity chain of the Schedule, not causing any effect on contract time. Time extensions will be granted in accordance with terms of contract.
3. Extension of contract time will be granted only to the extent the equitable time adjustments to activity or activities affected by modification, change, or delay exceeds total (positive or zero) float available on a particular activity.
4. Procedure: Each time impact analysis shall be submitted within time period stated in a request for proposal, or time period designated under the clauses entitled Changes or Default. In cases where Contractor does not submit a written request for extension of time and a time impact analysis within the designated time, it is mutually agreed that the particular modification, change, delay, or Contractor request does not require an extension of the contract time. Upon acceptance, time impact analysis shall be incorporated into currently accepted Construction Schedule at next monthly schedule update.
5. Contract Modifications: Prepare time-impact analysis using fragnets to demonstrate effect of proposed change on overall Construction Schedule for each proposed contract modification concurrent with submission.

END OF SECTION 01 32 16

SECTION 01 32 33 – PHOTO DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for:
 - 1. Existing condition images
 - 2. Periodic construction images
- B. See Section 01 77 00 "Closeout Procedures" for a complete listing of closeout documents.
- C. See Section 01 79 00 "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of National Park Service (NPS) personnel.

1.2 SUBMITTALS

- A. Construction Images: Submit images electronically within seven days of taking the image. Include:
 - 1. Date, time and number (sequentially number all images) in filename.
 - 2. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - 3. Submit digital images exactly as originally recorded in digital camera, without alteration, or modifications using image-editing software.
- B. Closeout: Submit complete set of digital image electronic files as a Project Record Document. Submit on USB drive.
 - 1. Provide index as separate file on USB. List each image as a file name with number, date, and time. Include description and or vantage point image was taken.
 - 2. Submit images that have the same aspect ratio as the sensor, un-cropped.

PART 2 - PRODUCTS

2.1 FORMAT REQUIREMENTS

- A. Media: USB Drive
- B. Images: Provide sRGB (standard Red Green Blue) color images in JPEG (Joint Photographic Experts Group) format. Minimum sensor size of 10 megapixels, and at image resolution of not less than 3200 by 2400, and 300 dpi (dots per inch).

PART 3 - EXECUTION

3.1 CONSTRUCTION IMAGES

- A. General: Take digital images using the maximum range of depth of field, in-focus, to clearly show the Work. No blurry or out-of-focus areas accepted.
 - 1. Maintain index with each set of Construction images and identify the number, date, time, and description for each.
 - 2. Maintain one set of images accessible in field office at Project site available for reference.
- B. Existing Condition Images: Before starting deconstruction or construction, take color digital images of Project site and surrounding properties, including existing items to remain during construction, from different vantage points.
 - 1. Flag construction limits before recording construction images.
 - 2. Take a minimum of ten separate images to show existing conditions adjacent to property before starting Work.
 - 3. Take a minimum of ten separate images of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
- C. Periodic Construction Images: Take a minimum of 12 color, digital images bi-weekly, with timing each month adjusted to coincide with cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last images were taken.
- D. Additional Images: Contracting Officer may issue requests for additional images.
 - 1. Three days advance, where feasible.
 - 2. In emergency situations, take additional images within 24 hours of request.
 - 3. Additional images include, but are not limited to:
 - a. Immediate follow-up when on-site events result in construction damage or losses.
 - b. Fabrication locations away from Project site.
 - c. Substantial Completion of a major phase or component of Work.
 - d. Extra record images at time of final acceptance.

END OF SECTION 01 32 33

SECTION 01 33 23 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS

- A. Action Submittals: Written, graphic information, and physical samples that require Government's responsive action.
- B. Informational Submittals: Written information that does not require Government's responsive action. Submittals may be rejected for not complying with requirements.
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.3 GENERAL SUBMITTAL PROCEDURES

- A. General: Prepare and submit submittals required by individual Specification Sections and in some cases as requested in drawings. Types of submittals are indicated in individual specific sections.
 - 1. Contracting Officer (CO) reserves right to require submittals in addition to those called for in individual sections.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Review for legibility, accuracy, completeness, and compliance with Contract Documents.
 - 1. Coordinate submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of Work so processing will not be delayed because of need for concurrent review coordination.
 - a. Contracting Officer reserves right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

- C. Submittal List: Submittal list is attached to the end of this Specification Section. The intent is to provide an overall summary of submittal requirements. The requirements of individual Specification Sections and terms and conditions of the Contract still apply regardless of what is shown on submittal list.
- D. Processing Time: Allow time for submittal review, including time for re-submittals, as follows. Time for review shall commence when e-mail notification is received by Contracting Officer (or designee) indicating submittal has been posted on NPS management software website and is ready for review. When Contracting Officer has completed review, e-mail notification will be sent to Contractor indicating submittal has been processed. No extension of Contract Time will be authorized because of failure to transmit submittals in advance of Work to permit processing, including re-submittals.
 - 1. Action Submittals
 - a. Initial Review: Allow **30** days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.
 - b. Re-submittal Review: Allow 20 days for review of each re-submittal.
 - 2. Informational submittals
 - a. Review: Allow **10** days for review of each submittal.
- E. Approved Equals:
 - 1. For each item proposed as an "approved equal," submit supporting data, including:
 - a. Drawings and samples as appropriate.
 - b. Comparison of the characteristics of the proposed item with that specified.
 - c. Changes required in other elements of the work because of the substitution.
 - d. Name, address, and telephone number of vendor.
 - e. Manufacturer's literature regarding installation, operation, and maintenance, including schematics for electrical and hydraulic systems, lubrication requirements, and parts lists. Describe availability of maintenance service, and state source of replacement materials.
 - 2. A request for approval constitutes a representation that Contractor:
 - a. Has investigated the proposed item and determined that it is equal or superior in all respects to that specified.
 - b. Will provide the same warranties for the proposed item as for the item specified.
 - c. Has determined that the proposed item is compatible with interfacing items.
 - d. Will coordinate installation of an approved item and make changes required in other elements of the work because of the substitution.
 - e. Waives claims for additional expenses that may be incurred as a result of the substitution.
- F. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Transmittal Form (CM-16): All submittals shall be transmitted using National Park Service Transmittal Form (CM-16). The form can be downloaded from the DSC Workflows website's [Submittal Review](#) page and completed on the NPS/DSC management software website. No action will be taken on a submittal item unless accompanied by this Transmittal Form.
 - a. Complete the general information at the top of form.
 - b. Provide all required information based on submittal type
 - c. Attach all related documents.
 - d. Sign the Contractor section at bottom of the Transmittal Form (CM-16).
 2. Physical samples: Complete Transmittal Form (CM-16) on the NPS/DSC management software website as described above. Deliver physical sample to the Contracting Officer (or designee) on site for processing. All comments and actions will be documented on the Transmittal Form (CM-16) on the NPS/DSC management software website.
- G. Identification: Submittal number or other unique identifier, including revision identifier.
1. Submittal number shall use a sequential number (e.g. .001). Re-submittals shall include alphabetic suffix after another decimal point (e.g. .001.A).
- H. Re-submittals: Make re-submittals using same process used with initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in the title block on the Transmittal Form (CM-16) and clearly indicate extent of revision.
 3. Re-submit submittals until they are marked "Approved" or "Approved with notations".
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, and others as necessary for performance of construction activities.
- J. Use for Construction: Use only final submittals with mark indicating "Approved" or "Approved with notations". Ensure notations have been incorporated and, at a minimum, keep one copy of final approved submittal on site for use during construction.

1.4 CONTRACTOR'S USE OF CAD/BIM FILES

- A. General: At Contractor's written request, copies of CAD (Computer Aided Design)/BIM (Building Information Modeling) files will be provided to Contractor for Contractor's use in connection with Project, subject to:
1. Files provided as is; no format or other changes to files or changes to objects in the drawing will be done by the Government

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- 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 printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each submittal to show which products and options are applicable.
 - 3. As applicable, include:
 - a. Manufacturer's product specifications.
 - b. Manufacturer's installation instructions: When Contract Documents require compliance with manufacturer's printed instructions, provide one complete set of instructions to Contracting Officer and keep another complete set of instructions at the project site until substantial completion.
 - c. Manufacturer's catalog cuts: Submit only pertinent pages; mark each page of standard printed data to identify specific products proposed for use.
 - d. Wiring diagrams showing factory-installed wiring.
 - e. Printed performance curves.
 - f. Operational range diagrams.
 - g. Compliance with specified referenced standards.
 - h. Testing by recognized testing agency.
 - 4. Submit product data in PDF (portable document format) file format 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 of CAD/BIM Drawings is otherwise permitted.
 - 1. Preparation: Fully illustrate requirements in Contract Documents. As applicable, include:
 - a. Dimensions
 - b. Identification of products
 - c. Fabrication and installation drawings
 - d. Roughing-in and setting diagrams
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring
 - f. Shopwork manufacturing instructions
 - g. Templates and patterns
 - h. Schedules
 - i. Notation of coordination requirements
 - j. Notation of dimensions established by field measurement
 - k. Relationship to adjoining construction clearly indicated
 - l. Seal and signature of professional engineer if specified
 - m. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring
 - 2. Submit shop drawings as PDF electronic file

- C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Complete and post the Transmittal Form (CM-16) on the NPS/DSC management software website for processing and documentation of action on submitted samples.
 3. Identification: Attach label on unexposed side of Samples that includes:
 - a. Generic description of Sample
 - b. Product name and name of manufacturer
 - c. Sample source
 - d. Submittal Number and title of appropriate Specification Section
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Contracting Officer will return with options selected.
 6. 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: 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 four sets of Samples. Contracting Officer will retain three Sample sets; remainder will be returned.
- D. Construction Materials: Contractor is encouraged to submit products made out of recycled or environmentally responsible material. Every effort will be made by National Park Service to approve these materials.

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by individual Specification Sections.
1. Post informational submittals as PDF electronic files directly to the NPS management software website.
 2. Certificates and Certifications: Provide a notarized statement with signature of entity responsible for preparing certification. Certificates and certifications shall be signed by officer or other individual authorized to sign documents on behalf of that entity.

3. Informational submittals that do not comply with requirements specified in Contract Documents will be rejected and one copy will be returned.
- B. Coordination Drawings: Comply with requirements specified in Section 01 31 00 "Project Management and Coordination."
 - C. Contractors Construction Schedule: Comply with requirements specified in Section 01 32 16 "Construction Schedule."
 - D. Accident Prevention Plan: Comply with requirements specified in Section 01 35 23 "Safety Requirements."
 - E. Schedule of Values: Comply with requirements specified in Section 01 32 16 "Construction Schedule."
 - F. Waste Recycling Plan: Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."
 - G. Quality Control Plan: Comply with requirements specified in Section 01 40 00 "Quality Requirements."
 - H. Storm Water Pollution Prevention Plan: Comply with requirements specified in Section 01 57 23 "Temporary Storm Water Pollution Prevention" and storm water permit requirements identified in Section 01 31 00 "Project Management and Coordination."
 - I. Indoor Air Quality Management Plan: Comply with requirements specified in Section 01 57 19.11 "Indoor Air Quality Management."
 - J. Leadership in Energy and Environmental Design (LEED™) Submittals: Comply with requirements specified in Section 01 81 13.13 "Sustainable Design Requirements - LEED for New Construction and Major Renovations," Section 01 81 13.16 "Sustainable Design Requirements - LEED for Commercial Interiors," Section 01 81 13.19 "Sustainable Design Requirements - LEED for Core and Shell Development," and Section 01 81 13.23 "Sustainable Design Requirements - LEED for Schools."
 - K. Qualification Data: Prepare written information demonstrating capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
 - L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on American Welding Society (AWS) forms. Include names of firms and personnel certified.
 - M. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying Installer complies with Contract Documents and, where required, is authorized by manufacturer for this specific Project.
 - N. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying manufacturer complies with Contract Documents. Include evidence of manufacturing experience where required.

- O. Product Certificates: Prepare written statements on manufacturer's letterhead certifying product complies with Contract Documents.
- P. Material Certificates: Prepare written statements on manufacturer's letterhead certifying material complies with Contract Documents.
- Q. Material Test Reports: Prepare 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 Contract Documents.
- R. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in 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.
- S. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.
- T. Preconstruction Test Reports: Prepare 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 Contract Documents.
- U. Compatibility Test Reports: Prepare 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.
- V. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, 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 Contract Documents.
- W. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Section 01 78 23 "Operation and Maintenance Data."
- X. Design Data: Prepare written and graphic information, including: performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- Y. Manufacturer's Instructions: Prepare written or published information documenting manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.
- Z. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. As applicable, include:
 - 1. Statement on condition of substrates and their acceptability for installation of product.

2. Summary of installation procedures being followed, compliance with requirements and, if not, what corrective action was taken.
 3. Results of operational and other tests and a statement of whether observed performance complies with the requirements.
- AA. Permit Compliance Products: Prepare required information for compliance with permit provisions. Products include written notification of project startup, suspension, and completion of work; photo documentation of site conditions; reports; and drawings.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of Contract and for compliance with Contract Documents. Note corrections and field dimensions.

3.2 CONTRACTING OFFICER'S ACTION

- A. General: Submittals will be disapproved without technical review if identification information is missing, not filled in, or if placed on back of submittal; an incorrect format of submittals is provided; transmittal form is incorrectly filled out; submittals are not coordinated; or submittals do not show evidence of Contractor's approval.
1. Any work done or orders for materials or services placed before approval shall be at Contractor's own risk.
- B. Action Submittals: Contracting Officer will review each submittal, generate comments on corrections or modifications required, and indicate appropriate action on the Transmittal Form (CM-16). Submittal will be marked as defined below:
1. APPROVED: Acceptable with no corrections.
 2. APPROVED WITH NOTATIONS: Minor corrections or clarifications required. Comments are clear and no further review is required. Contractor shall address review comments when proceeding with the work.
 3. DISAPPROVED - RESUBMIT: Rejected as not in accordance with the contract or as requiring major corrections or clarifications. Contracting Officer will identify reasons for disapproval. Contractor shall revise and resubmit with changes clearly identified.
- C. Informational Submittals: Contracting Officer will review each submittal and will either accept or reject it.
- D. Partial submittals are not acceptable, will be considered non-responsive, and will be returned without review.

END OF SECTION 01 33 23

Submittal List

National Park Service (NPS) - Denver Service Center (DSC) | 07-07-2023

SUBMITTAL LIST										
Park Acronym/Project Management Information System (PMIS) Number:						CALO 226858				
Project Title:		CALO Lighthouse Repairs								
SUBMITTAL			REQUIREMENTS (Indicate with X)							
SPECIFICATION SECTION	PARAGRAPH NUMBER	DESCRIPTION	INFORMATIONAL				ACTION			
			CERTIFICATIONS OR LABORATORY TESTS	REPORTS OR CALCULATIONS OR PLAN	MANUFACTURER DATA AND INSTRUCTIONS	OTHER	SAMPLES	SHOP DRAWINGS	MANUFACTURER DATA AND INSTRUCTIONS	OTHER
013100	1.4.A	Coordination Drawings						X		
013100	1.4.D	PreConstruction Conference Documents		X		X				
013218	1.3	Construction Schedule, Schedule of Values		X						
013233	1.2	Construction Images				X				
013523	1.3.A	Accident Prevention Plan		X						
013591	1.3.A-C	Historic Preservation Treatment Plan, Methods & Materials, & Photographs		X						
014000	1.4.A	Quality Control Plan		X						
014000	1.4.B	Qualification Data	X							
014000	1.4.C	Daily Reports		X						
014000	1.4.D	Test Reports	X							
014000	1.4.F	Off-Site Inspection Report	X							
015719	1.4	Indoor Air Quality Management Plan		X						
015723	1.3	SWPPP documents, Inspection Schedule, Erosion control products		X	X					

SUBMITTAL LIST

Park Acronym/Project Management Information System (PMIS) Number:

CALO 226858

Project Title:

CALO Lighthouse Repairs

SUBMITTAL			REQUIREMENTS (Indicate with X)							
SPECIFICATION SECTION	PARAGRAPH NUMBER	DESCRIPTION	INFORMATIONAL				ACTION			
			CERTIFICATIONS OR LABORATORY TESTS	REPORTS OR CALCULATIONS OR PLAN	MANUFACTURER DATA AND INSTRUCTIONS	OTHER	SAMPLES	SHOP DRAWINGS	MANUFACTURER DATA AND INSTRUCTIONS	OTHER
017000	1.3	Closeout Documents	X	X	X	X				
017329	1.2	Cutting and Patching plan		X						
017340	1.2	Landfill Receipts				X				
017419	1.4	Project Waste Management Plan & Associated Data		X	X					
017823	1.2	O&M Manual		X	X					
021500	1.4B	Working drawings showing layout, member sizes, connection details, and construction sequence for all bracing and shoring activity.						X		
021500	1.4B	Design calculations of bracing and shoring.						X		
024119	1.6A	Predisassembly photographs showing existing conditions before Work begins.				X				
024296	1.4A	Qualification data for historic removal and dismantling specialist.				X				
024296	1.4B	Preconstruction documentation showing preexisting conditions of adjoining construction and site.				X				

SUBMITTAL LIST

Park Acronym/Project Management Information System (PMIS) Number:

CALO 226858

Project Title:

CALO Lighthouse Repairs

SUBMITTAL			REQUIREMENTS (Indicate with X)							
SPECIFICATION SECTION	PARAGRAPH NUMBER	DESCRIPTION	INFORMATIONAL				ACTION			
			CERTIFICATIONS OR LABORATORY TESTS	REPORTS OR CALCULATIONS OR PLAN	MANUFACTURER DATA AND INSTRUCTIONS	OTHER	SAMPLES	SHOP DRAWINGS	MANUFACTURER DATA AND INSTRUCTIONS	OTHER
024296	1.4C	Architectural Component Documentation Program. All ironwork elements must be documented, noting geometry, connections and location. Overall geometry of brick masonry must be documented prior to disassembly. Contractor shall develop a numbering system to ensure comprehensive cataloging of the items to be repaired and salvaged.		X						
024296	1.4D	List of items indicated to be salvaged.				X				
028233	1.6A	Catalog Data for removal products								
028233	1.6B	Working Plan						X		
028233	1.6C	Field Test reports		X						
028333	1.5A	Personal protective equipment		X						
028333	1.5B	Closeout submittals	X							
033000	1.4A	Product data for each type of product.							X	
033000	1.4B	Design mixtures for each concrete mixture.								X
033000	1.4C	Shop drawings.						X		
033000	1.4D	Construction joint layout.						X		
033000	1.4E	Qualification data for installer, manufacturer, and testing agency.								X

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			CERTIFICATIONS OR LABORATORY TESTS	REPORTS OR CALCULATIONS OR PLAN	MANUFACTURER DATA AND INSTRUCTIONS	OTHER	SAMPLES	SHOP DRAWINGS	MANUFACTURER DATA AND INSTRUCTIONS	OTHER
033000	1.5A	Material certificates.	X							
033000	1.5B	Material test reports.	X							
033000	1.5C	Preconstruction test reports for each design mix.	X							
033000	1.5D	Field quality-control reports.		X						
040322	1.6A	Product data for each type of product.							X	
040322	1.6B	Samples for each type of exposed product and for each color and texture specified.					X			
040322	1.6C	Shop drawings, material certificates and test reports for cementitious injected grout anchors.						X	X	
040322	1.7A	Preconstruction test reports.	X							
040323	1.4A	Product data for each type of product.							X	
040323	1.4B	Samples for each type of exposed product and for each color and texture specified.					X			
050374	1.3A	Product data for each type of product.							X	
050374	1.3B	Shop drawings of each new metal item and component and its location on the structure.						X		
050383	1.4A	Product data for each type of product.							X	

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			CERTIFICATIONS OR LABORATORY TESTS	REPORTS OR CALCULATIONS OR PLAN	MANUFACTURER DATA AND INSTRUCTIONS	OTHER	SAMPLES	SHOP DRAWINGS	MANUFACTURER DATA AND INSTRUCTIONS	OTHER
050383	1.4B	Shop drawings showing locations and extent of repair and						X		
050383	1.5A	Evaluation reports for post-installed structural anchors.		X						
055000	1.2A	Product data.							X	
055000	1.2B	Shop drawings.						X		
061000	1.2A	Product data for each type of product and factory-fabricated							X	
061000	1.3A	Material certificates.	X							
075419	1.2A	Product data.							X	
075419	1.2B	Wind uplift resistance.							X	
075419	1.3A	Manufacturer certificates.	X							
075419	1.3B	Field quality-control reports.		X						
076100	1.2A	Product data.							X	
076100	1.2B	Shop drawings.						X		
076100	1.2C	Samples for each exposed product and for each color and					X			
076100	1.3A	Coordination drawings.		X						
076100	1.3B	Sample warranties for special warranties.				X				
076100	1.4A	Maintenance data for roofing sheet metals and accessories.			X					
079200	1.2A	Product Data							X	
079200	1.2B	Samples for Selection					X			
081433	1.2A	Shop Drawings for Wood Doors						X		

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			CERTIFICATIONS OR LABORATORY TESTS	REPORTS OR CALCULATIONS OR PLAN	MANUFACTURER DATA AND INSTRUCTIONS	OTHER	SAMPLES	SHOP DRAWINGS	MANUFACTURER DATA AND INSTRUCTIONS	OTHER
081433	1.4A	Shop Drawings for Wood Windows						X		
090110.15	1.4B	Qualifications	X							
090110.15	1.4C	Product Data							X	
090110.15	1.4D-F	Logs & disposal program		X						
099113	1.3A	Product Data							X	
099123	1.2A	Product Data							X	
099133	1.5A	Product Data							X	
099133	1.5B	Samples					X			
099600	1.3A	Product data for each type of product, including preparation requirements and application instructions.							X	
099600	1.3B	Samples for each type of coating system and in each color and gloss of topcoat indicated.					X			
230510	1A	Mechanical Coordination Drawings		X				X		
230529	1.5	Hangers and Supports for Piping and Equipment	X					X	X	
230548	.4 & 1.	Vibration and Seismic Control	X	X	X			X	X	
230553	1.3	Identification for HVAC Piping and Equipment						X	X	

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			CERTIFICATIONS OR LABORATORY TESTS	REPORTS OR CALCULATIONS OR PLAN	MANUFACTURER DATA AND INSTRUCTIONS	OTHER	SAMPLES	SHOP DRAWINGS	MANUFACTURER DATA AND INSTRUCTIONS	OTHER
230593	1.5	Testing, Adjusting, and Balancing for HVAC	X	X				X		
233413	1.3 - 1.5	HVAC Fans	X					X	X	
233713	1.3 & 1.5	Diffusers, Registers, and Grilles (Louvers)	X					X	X	
260500	1.7, 2.1	Common work Results for Electrical					X		X	
260511	1, 2.1, 2	Electrical Work Closeout		x			X		X	
260519	1.2	Low-Voltage Electrical Cables and Conductors					X		X	
260526	1.2	Grounding and Bonding for Electrical Systems					X		X	
260529	1.2	Hangers and Supports for Electrical Systems					X		X	
260533	1.1	Raceway and Boxes					X		X	
260548	1.1	Vibration and Seismic Controls	x	x	x		X		X	
260553	1.1	Identification for Electrical Systems					X		X	
262726	1.2	Wiring Devices					X		X	
264100	1.3	Facility Lightning Protection	X	x	x		x		x	
265100	1.2	Interior Lighting					x		x	

SECTION 01 35 23 - SAFETY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes establishing an effective accident prevention program and providing a safe working environment for personnel and visitors.

1.2 CONDITIONS PRESENT FOR PROJECT

- A. Scaffolding will be required on exterior of the building for removal of exterior coating, masonry repairs, and new coating
- B. Scaffolding or ladders will be required on interior for masonry repairs
- C. Hazardous Materials have been identified at all cast iron (to be encapsulated)
- D. Threat of severe weather at the lighthouse due to a variety of storm types
- E. Cape Lookout Lighthouse is on a remote island and will require coordination to get on and off island in the event of an accident.

1.3 SUBMITTALS

- A. Accident Prevention Plan (APP): Submit APP after contract award and before Pre-Construction conference. Contracting Officer (CO) will review proposed APP. If APP requires any revisions or corrections, Contractor shall resubmit Plan within 10 days. No progress payments will be made until the APP is accepted.

1.4 QUALITY ASSURANCE

- A. Comply with contract clauses "Accident Prevention" and "Permits and Responsibilities." In case of conflicts between Federal, State, and local safety and health requirements, the most stringent shall apply. Onsite equipment shall meet 29 CFR 1926 (Code of Federal Regulations) (Occupational Safety and Health Administration (OSHA)) requirements. Failure to comply with requirements of this section and related sections may result in suspension of work.
- B. Site Safety Supervisor:
 - 1. Designate authorized onsite representative for preparation and maintenance of the APP.
 - 2. Shall be responsible for:
 - a. Implementation and enforcement of the APP
 - b. Daily safety inspections
 - c. Conducting and documenting weekly and monthly safety meetings

- d. Review of safety requirements at progress meetings
- e. Compilation and maintenance of Safety Data Sheets (SDS) and safety reference materials
- f. Tracking and resolution of safety violations
- g. Site personnel and visitor compliance with site safety and health requirements and APP
- h. Investigation and reporting of accidents and injuries

C. Qualifications of Employees:

- 1. Physically and able to perform their assigned duties in a safe manner.
- 2. Do not allow employees whose ability or alertness is impaired because of prescription or illegal drug use, fatigue, illness, intoxication, or other conditions that may expose themselves or others to injury to perform work.
- 3. Provide operating instructions for equipment. Operators of vehicles, hoisting equipment, and hazardous plant equipment shall be able to understand signs, signals, operating instructions, and be fully capable of operating such equipment. Retain copies of operator licenses and certifications onsite.

1.5 ACCIDENT REPORTING

- A. Reportable Accidents: Defined as: death, occupational disease, and/or traumatic injury to employees or the public; fires; and/or property damage by accident in excess of \$100.
 - 1. Notify Contracting Officer immediately in the event of a reportable accident.
 - 2. Fill out and forward an Accident/Property Damage Report Form (CM-22) to Contracting Officer within 7 days of a reportable accident. Obtain form from Contracting Officer.

1.6 RESOURCES

- A. COVID-19 (Coronavirus Disease 2019) information provided below is not intended to provide a complete analysis of requirements for Contractor and is provided as a courtesy.
 - 1. [Coronoavirus.gov](https://www.cdc.gov/coronavirus)
 - 2. Occupational Safety and Health Administration (United States Department of Labor) - [COVID-19](https://www.osha-slc.gov/covid-19)
 - 3. Center for Disease Control (CDC)
 - a. [Get the Facts About Coronavirus](https://www.cdc.gov/media/releases/2020/s0508-coronavirus-facts.html)
 - b. [What Construction Workers Need to Know about COVID-19](https://www.dhs.gov/coronavirus)
 - 4. Federal Emergency Management Agency (FEMA) - [Coronavirus \(COVID-19\) Response](https://www.fema.gov/emergency-preparedness-response-recovery/coronavirus)
 - 5. National Park Service (NPS) - [NPS Public Health Update](https://www.nps.gov/visiting/planning/health-safety/coronavirus)

PART 2 - PRODUCTS

2.1 ACCIDENT PREVENTION PLAN (APP)

- A. APP shall be written to comply with OSHA and project requirements (generic plan is not acceptable) including but not limited to:

1. Name and qualifications of supervisor responsible to carry out program.
2. Weekly and monthly safety meetings shall be documented with topics and attendees.
3. First aid and rescue procedures.
4. Job Hazard Analysis (JHA) for each major phase. List of hazards associated and methods proposed to provide for property protection and safety of the public, National Park Service personnel, and Contractor's employees. Include initial and continuing training.
5. Planning for possible emergency situations, as detailed in Article 1.2. Such planning shall take nature of construction, site conditions, and degree of exposure of persons and property into consideration.
6. Infectious Disease Preparedness:
 - a. Contractors are responsible for their employees' safety and the safety of job site visitors during the performance of this contract. We encourage Contractors to follow guidance from the Department of Labor (DOL), Occupational Safety and Health Administration (OSHA), the Centers for Disease Control and Prevention (CDC), and all other applicable local, city, and state mandates. We encourage Contractors to develop policies for infection prevention and an Infectious Disease Preparedness and Response Plan.
 - b. To the extent appropriate, Contractors should include the protective health and safety measures they intend to implement in any accident prevention or safety submittals required under this contract. These plans should contain preventive measures the Contractor intends to follow while performing work on government property as well as responsive and corrective actions to be taken if an employee exhibits symptoms or tests positive for contagion.
 - c. Upon contract award, Contractors should communicate with Contracting Officer regarding Contractor decisions and actions to protect the health and safety of workers for the duration of contract performance under which pandemic conditions exist.

2.2 FIRST AID FACILITIES

- A. Provide adequate facilities for number of employees and appropriate to construction hazards.

2.3 PERSONNEL PROTECTIVE EQUIPMENT (PPE)

- A. Selection shall conform to OSHA Subpart E.

PART 3 - EXECUTION

3.1 DAILY SAFETY INSPECTIONS

- A. Conduct daily safety inspections and maintain daily safety reports which include:
 1. Area/operation inspected
 2. Date of inspection
 3. Identified hazards
 4. Corrective actions taken

3.2 EMERGENCY INSTRUCTIONS

- A. Post telephone numbers and reporting instructions for ambulance, physician, hospital, fire department, and police in conspicuous locations at work site.

3.3 FIRE AND LIFE SAFETY

- A. Comply with requirements of National Fire Protection Association (NFPA) 241 (Standard for Safeguarding Construction, Alteration, and Demolition Operations).

3.4 HAZARDOUS MATERIALS

- A. Hazardous materials: Explosive, flammable, poisonous, corrosive, oxidizing, irritating, or otherwise harmful substances that could cause death or injury.
- B. Store hazardous materials in accordance with manufacturer's and OSHA Subpart D requirements. Maintain Safety Data Sheets (SDS) for each chemical readily available on site.
 - 1. Immediately report spills of hazardous materials to the Park.
 - 2. Maintain a spill emergency response kit.
 - 3. Train employees how to respond to a spill and use emergency response kit.

3.5 PROTECTIVE EQUIPMENT

- A. Inspect personal protective equipment daily and maintain in a serviceable condition. Clean, sanitize, and repair personal items as appropriate before issuing to another individual.

3.6 SAFETY MEETINGS

- A. As a minimum, conduct one weekly 15-minute "toolbox" safety meeting conducted by a foreman or supervisor and attended by construction personnel at worksite. Topics shall coincide with work scheduled for following week. Document and submit meeting minutes to Contracting Officer within one day after meeting.
- B. Conduct monthly safety meetings for personnel, contractors, and subcontractors performing work on the site. Notify Contracting Officer of meeting dates and times. Meetings shall be used to: review effectiveness of Contractor's safety effort; resolve current health and safety problems; provide a forum for planning safe construction activities, and for updating Accident Prevention Plan. Contracting Officers Representative will attend meetings and enter results of meetings into the daily log.

3.7 HARD HATS AND PROTECTIVE EQUIPMENT AREAS

- A. A hard hat use area shall be designated by Contractor. Hard hat area shall be posted by Contractor in a manner satisfactory to Contracting Officer.

- B. It is Contractor's responsibility to require persons working on or visiting site to wear hard hats and PPE in good repair at all times. As a minimum, maintain a minimum of six hard hats and other APP required equipment.

3.8 TRAINING

- A. First Aid: Provide training to personnel to ensure prompt and efficient first aid.
- B. Hazardous Material: Train and instruct each employee exposed to hazardous material in safe and approved methods of handling and storage.

END OF SECTION 01 35 23

SECTION 01 35 91 - HISTORIC PRESERVATION TREATMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes special procedures for historic treatment on Project including, but not limited to:
 - 1. Definitions
 - 2. Submittals
 - 3. Quality Assurance
 - 4. Storage and protection of existing historic materials
 - 5. Project site conditions
 - 6. Historic Preservation Treatment Plan
 - 7. Protection, General
 - 8. Protection during application of chemicals
 - 9. Protection during use of heat-generating equipment
 - 10. Historic preservation treatment procedures

1.2 DEFINITIONS

- A. "Preservation" - To apply measures necessary to sustain existing form, integrity, and materials of historic property. Work may include preliminary measures to protect and stabilize the property.
- B. "Rehabilitation" - To make possible a compatible use for property through repair, alterations, and additions while preserving those portions or features that convey its historical, cultural, or architectural values.
- C. "Restoration" - To accurately return form, features, and character of a property to its appearance at a particular period of time by means of removal of features from other periods in its history and repair and reconstruction of missing and deteriorated features from the restoration period.
- D. "Reconstruction" - To reproduce in exact form and detail, a building, structure, or artifact as it appeared at a specific period in time. Reconstructed elements do not possess historic integrity in their own right since they are-not original fabric.
- E. "Stabilize" - To apply measures designed to reestablish a weather-resistant enclosure and structural reinforcement of an item or portion of the building while maintaining essential form as it exists at present. This level of intervention is aimed at retarding or arresting adverse impacts to structures.
- F. "Protect and Maintain" - To remove deteriorating corrosion, reapply protective coatings, and install protective measures such as temporary guards; to provide the least degree of intervention.
- G. "Repair" - To stabilize, consolidate, or conserve; to retain existing materials and features while employing as little new material as possible. Repair includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials. Within restoration, repair also includes limited replacement in kind, rehabilitation, and reconstruction, with compatible

substitute materials for deteriorated or missing parts of features when there are surviving prototypes.

- H. "Replace" - To duplicate in its entirety, a historic element or feature by matching its historic pattern, detail and appearance. Replacement is justified when original or historic elements are damaged beyond repair or are missing. Replacement conditions and methods include:
 - 1. Replacement with Original or Historic Fabric: Includes fabric salvaged from other locations or projects having identical architectural qualities. Duplication of appearance using identical material possessing historical significance.
 - 2. Replacement with New Materials: Includes replacement with new material of like kind (custom fabricated or manufactured). Duplication of appearance using like material.
 - 3. Replacement with Substitute Materials: Includes replacement with a compatible substitute that is frequently contemporary and unlike the historic fabric. Duplication of appearance using modern (non-traditional) material. Use of substitute materials is not approved unless matching materials are not available.
- I. "Remove" - To demolish or detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- J. "Remove and Salvage" - To detach items from existing construction and deliver them ready for reuse to Contracting Officer (CO) or designee.
- K. "Remove and Reinstall" - To detach items from existing construction, repair and prepare for reuse, and reinstall where indicated.
- L. "Existing to Remain" or "Retain" - Existing items of construction not to be removed and not otherwise indicated to be removed and salvaged or removed and reinstalled.
- M. "Material in Kind" - Material that closely matches existing materials through comparison of architectural qualities and salient characteristic such as species, cut, color, grain, dimension, profile, thickness, and finish.

1.3 SUBMITTALS

- A. Historic Preservation Treatment Plan:
 - 1. After contract award and before Pre-Construction conference, submit for approval a written Historic Preservation Treatment Plan (HPTP).
 - 2. If the plan requires revisions or corrections, Contractor shall resubmit plan within 10 days.
 - 3. No change in approved plan may be made without written concurrence by Contracting Officer.
- B. Alternative Methods and Materials: If alternative methods and materials to those indicated are proposed for any phase of work, provide a written description including evidence of successful use on other, comparable projects, and program of testing to demonstrate effectiveness for use on this Project.
- C. Photographs or Videotape: In accordance with Section 01 32 33 "Photographic Documentation," show existing conditions of adjoining construction and site improvements including finish

surfaces that might be misconstrued as damage caused by historic treatment operations. Submit before work begins.

1.4 QUALITY ASSURANCE

- A. Historic Preservation Treatment Specialist Qualifications: Experienced firm with required certifications and training able to demonstrate through past performance they are qualified to perform this work.

1.5 STORAGE AND PROTECTION OF HISTORIC MATERIALS

A. Removed and Salvaged Historic Materials:

1. Clean salvaged historic items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in secure area until delivery to Contracting Officer.
4. Transport items to storage area as noted from Park Staff.
5. Protect items from damage during transport and storage.
6. Do not dispose of items removed from existing construction without prior written consent of Contracting Officer.

B. Removed and Reinstalled Historic Materials:

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

- C. Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling during historic treatment. When permitted by Contracting Officer, items may be removed to suitable, protected storage location during historic treatment and cleaned and reinstalled in their original locations after historic treatment operations are complete.

- D. Storage and Protection: When removed from existing location, store historic materials within weather-tight enclosure protected from wetting by rain, snow, or ground water, and temperature variations. Secure stored materials to protect from theft.

1. Identify removed items with an inconspicuous mark indicating original location.
2. Develop key plan when many similar items are scheduled for removal and reinstallation.

1.6 PROJECT-SITE CONDITIONS

A. Exterior Cleaning and Repairing:

1. Proceed with work only when forecasted weather conditions are favorable.

- a. Wet Weather: Do not attempt repairs during rainy or foggy weather. Do not apply primer, paint, putty, or epoxy when relative humidity is above 80 percent. Do not remove exterior elements of structures when rain is forecast or in progress.
 - b. Do not perform exterior wet work when air temperature is below 40 degrees Fahrenheit (5 degrees Celsius).
 - c. Do not begin cleaning, patching, or repairing given likelihood of frost or freezing.
 - d. Do not begin cleaning when either air or surface temperature is below 45 degrees Fahrenheit (7 degrees Celsius) unless approved means are provided for maintaining 45 degrees Fahrenheit (7 degrees Celsius) temperature of air and materials during, and for 48 hours subsequent to, cleaning.
2. Perform cleaning and rinsing of the exterior only during daylight hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 HISTORIC PRESERVATION TREATMENT PLAN

- A. Prepare written plan for preservation work covering preservation components of project. Plan shall verify construction strategy and intent is compatible with Department of the Interior's (DOI) standards for Treatment of Historic Properties, guidelines for Treatment of Cultural Landscapes, and National Park Service management policies for cultural resources. Plan shall satisfy both project scope and resource protection requirements. Plan shall include:
 1. Organized list of preservation components of project, systems, and tasks
 2. Staging and sequence of work
 3. Disassembly and reassembly techniques and steps
 - a. This shall require an architectural and structural component documentation program
 - 1) All individual ironwork elements of the lighthouse shall be documented in their geometry, connections, and locations.
 - 2) All brick masonry elements of the lighthouse shall be documented for its location and reassembly
 4. Equipment and tools required
 5. Supplies and materials with manufacturer or supplier identified including specific clean up/storage procedure including frequency and documentation of such.
 6. Skilled trades and crafts required
 7. Anticipated testing and analysis of fabric
 8. Additional investigations for extents or magnitude of treatments needed
 9. Protective measures
 10. Seasonal limitations on work
 11. Alternative means if primary treatment method is unfeasible
 12. Work conducted off-site (Approval from Contracting Officer required prior to taking resources off-site).

3.2 PROTECTION, GENERAL

- A. Comply with manufacturer's written instructions for precautions and effects of products and procedures on adjacent building materials, components, and vegetation.
- B. Ensure supervisory personnel are present when work begins and during progress.
- C. Temporary Protection of Historic Materials during Construction:
 - 1. Protect existing materials during installation of temporary protections and construction. Do not deface or remove existing materials.
 - 2. Attachments of temporary protection to existing construction shall be approved by Contracting Officer prior to installation.
- D. Protect landscape work adjacent to or within work areas as follows:
 - 1. Provide barriers to protect tree trunks.
 - 2. Bind spreading shrubs.
 - 3. Coverings shall allow plants to breathe. Remove coverings at end of day. Do not cover plant material with waterproof membrane more than 8 hours at a time.
 - 4. Set scaffolding and ladder legs away from plants.

3.3 PROTECTION DURING APPLICATION OF CHEMICALS

- A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm or damage resulting from applications of chemical cleaners and paint removers.
- B. Comply with requirements in Section 01 50 00 "Temporary Facilities and Controls."
- C. Cover adjacent surfaces with materials proven to resist chemical cleaners selected for Project unless chemicals being used will not damage adjacent surfaces. Use covering materials containing only waterproof, UV (ultraviolet)-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. Promptly remove masking to prevent adhesive staining on completion.
- D. Do not clean surfaces during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
- E. Neutralize and collect alkaline and acid wastes and dispose of outside park boundaries.
- F. Dispose of runoff from chemical operations by legal means and in a manner preventing soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
- G. Document daily clean-up, proper storage, and disposition of any flammable/combustible materials with daily reports.

3.4 PROTECTION DURING USE OF HEAT-GENERATING EQUIPMENT

- A. Comply with following procedures while performing work with heat-generating equipment, including welding, cutting, soldering, brazing, paint removal with heat, and other operations where open flames or implements utilizing heat are used:
1. Obtain Contracting Officer's approval for operations involving use of open-flame or welding equipment.
 - a. Notification shall be given for each occurrence and location of work with heat-generating equipment.
 - b. Obtain appropriate permit from the park as required.
 2. As far as practical, use heat-generating equipment in shop areas or outside building.
 3. Before work with heat-generating equipment commences, furnish fire watch (or watches) for location(s) where work is to be performed.
 4. 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 combustible gas indicator test to ensure area is safe.
 5. Remove and keep area free of combustibles, including, rubbish, paper, waste, etc., within area of operations.
 - a. If combustible material cannot be removed, provide fireproof blankets to cover such materials.
 6. Where possible, furnish and use baffles of metal or gypsum board to prevent spraying of sparks or hot slag into surrounding combustible material.
 7. Prevent extension of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
 8. Inspect each location of day's work not sooner than 30 minutes after completion of operations to detect hidden or smoldering fires; ensure proper housekeeping is maintained.
- B. Where sprinkler protection exists and is functional, maintain without interruption while operations are performed. If operations are performed near automatic sprinkler heads, shield individual heads temporarily with guards.

3.5 HISTORIC PRESERVATION TREATMENT PROCEDURES

- A. The principal aim of preservation work is to halt the process of deterioration and stabilize the item's condition to sustain the integrity of the historic element, feature or structure being preserved. Cyclic maintenance is often required as well as repair work. Repair is required where specifically indicated. The following procedures shall be followed:
1. Retain as much existing material as possible; repair and consolidate rather than replace.
 2. Use additional material or structure to reinforce, strengthen, prop, tie, and support existing material or structure.
 3. Use reversible processes wherever possible.
 4. Use traditional replacement materials and techniques if possible. New work shall be distinguishable from old work and original materials and techniques.

5. Record repair work during construction with periodic construction photos, daily inspection reporting, and scaled documents depicting each cast iron piece removed. Photo documentation is specified in Section 013233 "Photographic Documentation."
- B. Prohibit smoking by personnel performing work on or near historic structures.
- C. Notify Contracting Officer of visible changes in integrity of material or components due to environmental causes including biological attack, UV degradation, freezing, or thawing, or due to structural defects including cracks, movement, or distortion.
 1. Do not proceed with work in question until directed by Contracting Officer.
- D. Where Work requires existing features to be removed, cleaned, and reinstalled, perform operations without damage to material itself, to adjacent materials, or to substrate.
- E. Identify new or replacement materials and features with inconspicuous, permanent marks to distinguish from original materials. Record legend of identification marks and locations of these marks on Record Drawings.
- F. When cleaning, match samples of existing materials that have been cleaned and identified for acceptable cleaning levels. Avoid over-cleaning to prevent damage. Use gentlest methods available. Initiate cleaning using hand cleaning methods before introducing power cleaning methods and equipment.

END OF SECTION 01 35 91

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements. Quality of work shall be responsibility of the Contractor.
 - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality assurance and control procedures that facilitate compliance with Contract Document requirements.
- C. See Divisions 2 through 49 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

- A. 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.
- B. Quality Control Services: Tests, inspections, procedures, and related actions during and after execution of the work to evaluate actual products incorporated into the work and completed construction comply with requirements.
- C. Mockups: Full-size physical assemblies constructed on-site. Mockups are constructed from selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Approved mockups establish the standard by which the Work will be judged, unless otherwise indicated.
 - 1. Laboratory Mockups: Full-size physical assemblies constructed at a testing facility to verify performance characteristics.
 - 2. Integrated Exterior Mockups: Mockups of exterior envelope erected separately from building but on Project site, consisting of multiple products, assemblies, and subassemblies.
 - 3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.
- D. Preconstruction Testing: Tests and inspections performed specifically for project before products and materials are incorporated into work to verify performance or compliance with specified criteria.

- E. Product Testing: Tests and inspections performed by a Nationally Recognized Testing Laboratory (NRTL), a National Voluntary Laboratory Accreditation Program (NVLAP), or a testing agency qualified to conduct product testing, to establish product performance and compliance with industry standards.
- F. Source Quality Control Testing: Tests and inspections performed at the source, i.e., plant, mill, factory, or shop.
- G. Field Quality Control Testing: Tests and inspections performed on-site for installation of work and for completed work.
- H. Testing Agency or Laboratory: Entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of corresponding generic name.

1.3 CONFLICTING REQUIREMENTS

- A. Reference Standards: If compliance with two or more standards is specified and standards establish different or conflicting requirements for minimum quality levels, comply with most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Contracting Officer before proceeding.
- B. Minimum Quality Levels: Quality level shown or specified shall be minimum provided or performed. Actual installation may comply exactly with minimum quality specified, or it may exceed minimum within reasonable limits. To comply with requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Contracting Officer before proceeding.

1.4 SUBMITTALS

- A. Quality Control Plan:
 - 1. After contract award and before Pre-Construction conference, submit a written Contractor Quality Control (CQC) plan.
 - 2. If plan requires revisions or corrections, Contractor shall resubmit plan within 10 days.
 - 3. Government reserves the right to require changes in plan during contract period as necessary to obtain the quality specified.
 - 4. No change in the approved plan may be made without written concurrence by Contracting Officer.

- B. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in form of a recent report on inspection of testing agency by a recognized authority.
- C. Contractor Quality Control (CQC) Daily Reports: Submit showing inspections and tests on first workday following date covered by report. Quality Control Supervisor shall utilize [DSC Forms](#).
 - 1. Review Construction Management Representative (CMR) Daily report if applicable and reconcile any differences prior to posting.
- D. Test Reports
 - 1. Test reports shall be completed by person performing test.
 - 2. Submit Daily Test Information Sheets with Quality Control Daily Reports.
 - 3. Submit failing test results and proposed remedial actions within four hours of noted deficiency.
 - 4. Submit three copies of complete test results no later than one calendar day after test was performed.
- E. Accessibility Inspection Report:
 - 1. Fill out applicable sections of the Accessibility Inspection Report and attach to Contractor Quality Control Daily Report.
 - 2. Utilize attached Accessibility Inspection form to document compliance with Architectural Barriers Act Accessibility Standards (ABAAS).
 - 3. Inspect at various stages of construction as needed to ensure finished product meets standards.
 - 4. Submit report no later than one calendar day after inspection was performed.
- F. Off-Site Inspection Reports: Submit prior to shipment.
- G. If Contractor Quality Control plan and Quality Control Daily Reports are not submitted as specified, Contracting Officer may retain payments until such time plan(s) is/are accepted and implemented, or may retain payments for work completed on days with no Quality Control Daily Reports.
- H. Permits, Licenses, and Certificates: For National Park Service (NPS) records, 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 work.

1.5 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Contractors Quality Control Staff:
 - 1. Contractor's Quality Control Supervisor may also perform other duties.
 - 2. Contractor's designated Quality Control Supervisor shall be on the project site whenever contract work is in progress.

3. Contractor's job supervisory staff may be used to assist Quality Control Supervisor supplemented, as necessary, by additional certified testing technicians.
- C. Installer Qualifications: Firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent indicated for Project, whose work has resulted in construction with a record of successful in-service performance.
 - D. Manufacturer Qualifications: Firm experienced in manufacturing products or systems similar to those indicated for Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
 - E. Fabricator Qualifications: Firm experienced in producing products similar to those indicated for Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
 - F. Professional Engineer Qualifications: Professional engineer legally qualified to practice in jurisdiction where Project is located and is experienced in providing engineering services of kind indicated (including Structural Tests and Special Inspections (STSI)). Engineering services are defined as those performed for installations of system, assembly, or products similar to those indicated for Project in material, design, and extent.
 - G. Specialists: Certain sections of the Specifications 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 activities indicated.
 1. Requirement for specialists shall not supersede building codes and regulations governing Work.
 - H. Testing Agency Qualifications: A Nationally Recognized Testing Laboratory (NRTL), a National Voluntary Laboratory Accreditation Program (NVLAP), or an independent agency with experience and capability to conduct testing and inspecting indicated, according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by Contract, is acceptable to Contracting Officer.
 1. Nationally Recognized Testing Laboratory (NRTL): Nationally recognized testing laboratory according to 29 CFR 1910.7 (Code of Federal Regulations).
 2. National Voluntary Laboratory Accreditation Program (NVLAP): Testing agency accredited according to National Institute of Standards and Technology's (NIST) National Voluntary Laboratory Accreditation Program.
 3. Measuring devices, laboratory equipment, and instruments shall be calibrated at established intervals against certified standards in accordance with NIST requirements. Measuring and testing devices shall be made available for use by Government for verification tests.
 - I. Factory-Authorized Service Representative Qualifications: Authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products similar in material, design, and extent to those indicated for Project.
 - J. Mockups: Before installing portions of work requiring mockups, build mockups for each form of construction and finish required to comply with following requirements, using materials indicated for completed work:

1. Build mockups in location and of size indicated; if not indicated, as directed by Contracting Officer.
 2. Notify Contracting Officer 15 days in advance of dates and times when mockups will be constructed.
 3. Demonstrate proposed range of aesthetic effects and workmanship.
 4. Obtain Contracting Officer's approval of mockups before starting work, fabrication, or construction.
 5. Maintain mockups in an undisturbed condition as a standard for judging the completed work.
 6. Demolish and remove mockups when directed, unless otherwise indicated.
- K. Integrated Exterior Mockups: Construct integrated exterior mockup as indicated on approved shop drawings. Exterior mockup to be no less than 10' x 10' in size. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.
1. Shall include, but not be limited to exterior paint removal, brick repair, brick replacement, repointing, and repainting.
- L. Integrated Interior Mockups: Construct integrated interior mockup as indicated on approved shop drawings. Interior mockup to be no less than 10' x 10' in size. Coordinate installation of interior materials and products for which mockups are required in individual Specification Sections, along with supporting materials.
1. Shall include, but not be limited to brick repair, brick replacement, repointing, and repainting.

1.6 QUALITY CONTROL

- A. Contractor is responsible for testing and inspections, including Structural Tests and Special Inspections (STSI), as identified in attached STSI. Inspect and test work as needed to ensure quality of materials, workmanship, construction, finish, and functional performance are in compliance with applicable specifications, drawings, and those required by the Building Code.
1. Engage qualified testing agency to perform quality-control services.
 2. Submit appropriate report for each quality-control service.
 3. Testing and inspecting requested by Contractor and not required by Contract Documents are Contractor's responsibility.
 4. Contracting Officer may designate test locations.
- B. Manufacturer's Field Services: Where indicated, engage factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.
- C. Re-testing/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction of replaced work that failed to comply with Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with NPS and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Contracting Officer and Contractor promptly of irregularities or deficiencies observed in work during performance of services.

2. Determine location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections, State in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit 3 copies of certified written report of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase Contract Document requirements or approve or accept any portion of Work.
- E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide:
1. Access to Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for material mixes that require control by testing agency.
 7. Security and protection for samples and testing and inspecting equipment at Project site.
- F. Coordination: Coordinate sequence of activities to accommodate required quality assurance and control services with minimum delay and to avoid removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS

2.1 QUALITY CONTROL PLAN

- A. Quality Control Plan shall include:
1. List of personnel responsible for quality control and assigned duties. Include each person's qualifications. Include alternate(s) and qualifications.
 2. Copy of letter of direction to Contractor's Quality Control Supervisor(s) outlining assigned duties and authorities designated by principal or owner.
 3. Names, qualifications / accreditations, and descriptions of laboratories to perform sampling and testing, and samples of proposed report forms from laboratories.
 4. Methods of performing, documenting, and enforcing quality control of work including Contractor report forms and acknowledgment of NPS forms.
 5. Methods of monitoring and controlling environmental pollution and contamination as required by regulations and laws.
 6. Specific discussion regarding mockups, off-site visits, receiving inspections, manufacturers representation, startup requirements, and other aspects of performance specific to Project.
 7. Provisions for substantial completion(s) and final inspection(s) per Contract.

PART 3 - EXECUTION

3.1 OFF-SITE CONTROL

- A. Items fabricated or assembled off-site shall be inspected for quality control at place of fabrication.

3.2 ON-SITE CONTROL

- A. Notification:

- 1. Notify Contracting Officer at least 48 hours in advance of preparatory phase meeting.
 - 2. Notify Contracting Officer at least 24 hours in advance of initial and follow-up phases.

- B. Preparatory Phase: Perform before beginning each feature of work.

- 1. Review control submittal requirements with personnel directly responsible for quality assurance and quantity control of the work. As a minimum, Contractor's Quality Control Supervisor and foreman responsible for feature of work shall be in attendance.
 - 2. Review applicable specifications sections and drawings related to feature of work.
 - 3. Ensure copies of referenced standards related to sampling, testing, and execution for feature of work are available on site.
 - 4. Ensure provisions have been made for field control testing.
 - 5. Examine work area to ensure preliminary work has been completed.
 - 6. Verify field dimensions and advise Contracting Officer of discrepancies with contract documents.
 - 7. Ensure necessary equipment and materials are at project site and they comply with approved shop drawings and submittals.
 - 8. Document preparatory phase activities and discussions on Contractor's Quality Control Daily Report.

- C. Initial Phase:

- 1. As soon as work begins, inspect and test representative portion of particular feature of work for quality of workmanship.
 - 2. Review control testing procedures to ensure compliance with contract requirements.
 - 3. Document initial phase activities and discussions on Contractor's Quality Control Daily Report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.

- D. Follow-Up Phase: Inspect and test as work progresses to ensure compliance with contract requirements until completion of work.

- E. Additional Preparatory and Initial Phases: Additional preparatory and initial phases may be required on same feature of work for following reasons:

- 1. Quality of on-going work is unacceptable.
 - 2. Changes in quality control staff, on-site production supervision, or work crew.
 - 3. Work on particular feature of work is resumed after substantial period of inactivity.

3.3 DOCUMENTATION

- A. Maintain Quality Control Daily Reports, Daily Test Report Information Sheets, and Accessibility Inspection Reports of quality control activities and tests. (Download from DSC Workflows website > Forms/Templates/Samples/Guidelines page > [Construction Forms](#) section.)
- B. Quality Control Daily Reports shall not be substituted for other written reports required under clauses of contract, such as Disputes, Differing Site Conditions, or Changes.
- C. Quality Control Daily Reports shall accurately portray all work and materials. The materials shall match the materials as approved from the Construction Documents (CD) requirements. Combustible/flammable materials shall be documented as well.

3.4 ENFORCEMENT

- A. Contractor shall stop work on any item or feature pending satisfactory correction of deficiency noted by quality control staff or Contracting Officer.

3.5 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, 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. Restore patched areas and extend restoration into adjoining areas with durable seams as invisible as possible.
 - 2. Comply with Contract Document requirements for Section 01 73 29 "Cutting and Patching."
- 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 01 40 00

Statement of Structural Tests and Special Inspections

National Park Service (NPS) - Denver Service Center (DSC) | 6-29-21

Park: Cape Lookout National Seashore (CALO)

Project Management Information System (PMIS) Number: 226858

Project Name: Repair Cape Lookout Lighthouse

Structural Engineering Firm: Bennett Preservation Engineering, PC

This Statement of Structural Tests and Special Inspections is being submitted as required by Chapter 17 of the **2015 International Building Code** (IBC-15). It includes the following:

1. Seismic requirements
2. Wind requirements
3. Qualification Requirements for Inspectors and Testing Technicians
4. Listing of Required Structural Tests and Special Inspections

The Construction Contractor's Quality Control Supervisor will provide copies of all special inspection reports and associated documentation to the Contracting Officer (CO). The Construction Contractor will be required to correct all deficiencies discovered in the Special Inspection and Structural Testing program.

Prepared By: Craig M. Bennett, Jr. PE
(Type or print name)

Signature: _____

Date: July 7, 2023



Stamped by Professional Engineer (PE) or Structural Engineer (SE)

Seismic and Wind Requirements

Seismic Requirements, IBC-15 Section 1704.3

Description of seismic-force-resisting system and designated seismic systems subject to special inspections:

Not Applicable.

Wind Requirements, IBC-15 Section 1704.3

Description of wind-force-resisting system and designated wind systems subject to special inspections:

Periodic special inspection is required for fastening of the following wind resisting components:

- Temporary roof at the Watch Level,
- The following permanent elements:
 - o Chimney and lightning rod
 - o Roof covering
 - o Roof framing and connections
 - o Lantern framing and connections
 - o Lantern Level exterior deck
 - o Watch Level exterior deck
 - o Grouted sleeve anchors at the masonry at the Watch Level

Instructions:

1. Under [Listing of Required Structural Tests and Special Inspections](#):
 - a. **Required?** - Place an **X** for all Special Inspections and Tests required for this project.
 - b. **Required Qualifications** - Provide qualifications for the special inspector, using the [Qualification Requirements for Inspector and Testing Technicians](#) list below, for all required Structural Tests and Special Inspections.
 - c. **Continuous** - If marked with an **X**, continuous special inspection shall be as defined in Chapter 2, IBC-15.
 - d. **Periodic** - If marked with an **X**, provide the minimum number of tests, i.e. 20% of all field welds, or the amount of work to be inspected (e.g. 10% of all wall surfaces).
2. Attach completed Statement of Structural Tests and Special Inspections to the end of NPS DSC Division 1 Specifications **Section 01 40 00 Quality Requirements**.

Qualification Requirements for Inspectors and Testing Technicians

PE/SE	Structural Engineer – licensed PE or SE specializing in the design of buildings and structures
PE/GE	Geotechnical Engineer – licensed PE specializing in soil mechanics and foundations
EIT	Engineer-In-Training – graduate engineer who has passed the Fundamentals of engineering examination

American Concrete Institute (ACI) Certification

ACI-CCSI	Concrete Construction Special Inspector
ACI-LTT	Concrete Laboratory Testing Technician Level 1 or 2
ACI-STT	Concrete Strength Testing Technician
ACI-FTT	Concrete Field Testing Technician – Grade I

American Society of Non-Destructive Testing (ASNT) Certification

Non-Destructive Testing Technician – Level II or III

American Welding Society (AWS) Certification

AWS-CWI	Certified Welding Inspector
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Exterior Design Institute (EDI) Certification

EDI-EIFS	Certified EIFS inspector
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International Code Council (ICC) Certification

ICC-PCSI	Prestressed Concrete Special Inspector
ICC-RCSI	Reinforced Concrete Special Inspector
ICC-SSI	Soils Special Inspector
ICC-SFSI	Spray-applied Fireproofing Special Inspector
ICC-SMSI	Structural Masonry Special Inspector
ICC-SSBSI	Structural Steel and Bolting Special Inspector
ICC-SWSI	Structural Welding Special Inspector

National Institute for Certification in Engineering Technologies (NICET) Certification

NICET-CT	Concrete Technician – Levels I, II, III and IV
NICET-GET	Geotechnical Engineering Technician - Levels I, II, III and IV
NICET-ST	Soils Technician - Levels I, II, III and IV

Other

ICC-CBI

Commercial Building Inspector

Listing of Required Structural Tests and Special Inspections

Required?	Structural Test or Special Inspection	Required Qualifications	Continuous	Periodic	Frequency of Periodic Test or Inspection
Steel Construction (IBC-15 Section 1705.2; American Institute of Steel Construction: AISC 360-16 Chapter N, AISC 341-16 Chapter J)					
	Prior to Welding (AISC 360-16 Table N5.4-1)				
	1. Welder qualification records and continuity records	AWS-CWI, ICC-SWSI			
	2. Welding procedure specifications (WPS) available	AWS-CWI, ICC-SWSI			
	3. Manufacturer certifications for welding consumables available	AWS-CWI, ICC-SWSI			
X	4. Material identification (type/grade)	AWS-CWI, ICC-SWSI		X	Once for each type of element used.
X	5. Welder identification system	AWS-CWI, ICC-SWSI		X	Once per welder.
	6. Fit-up of groove welds (including joint geometry)				
	a. Joint preparation	AWS-CWI, ICC-SWSI			
	b. Dimensions (alignment, root opening, root face, bevel)	AWS-CWI, ICC-SWSI			
	c. Cleanliness (condition of steel surfaces)	AWS-CWI, ICC-SWSI			
	d. Tacking (tack weld quality and location)	AWS-CWI, ICC-SWSI			
	e. Backing type and fit (if applicable)	AWS-CWI, ICC-SWSI			
	7. Fit-up of CJP (complete joist penetration) groove welds of HSS (hollow structural sections) T-, Y- and K-joints without backing (including joint geometry)				
	a. Joint preparation	AWS-CWI,			

Required?	Structural Test or Special Inspection	Required Qualifications	Continuous	Periodic	Frequency of Periodic Test or Inspection
		ICC-SWSI			
	b. Dimensions (alignment, root opening, root face, bevel)	AWS-CWI, ICC-SWSI			
	c. Cleanliness (condition of steel surfaces)	AWS-CWI, ICC-SWSI			
	d. Tacking (tack weld quality and location)	AWS-CWI, ICC-SWSI			
	8. Configuration and finish of access holes	AWS-CWI, ICC-SWSI			
	9. Fit-up of fillet welds				
X	a. Dimensions (alignment, gaps at root)	AWS-CWI, ICC-SWSI		X	Once per weld type.
X	b. Cleanliness (condition of steel surfaces)	AWS-CWI, ICC-SWSI		X	Once per weld type.
X	c. Tacking (tack weld quality and location)	AWS-CWI, ICC-SWSI		X	Once per weld type.
X	10. Check welding equipment	AWS-CWI, ICC-SWSI		X	Once.
During Welding (AISC 360-16 Table N5.4-2)					
	1. Control and handling of welding consumables				
X	a. Packaging	AWS-CWI, ICC-SWSI		X	Weekly.
X	b. Exposure control	AWS-CWI, ICC-SWSI		X	Weekly.
X	2. No welding over cracked tack welds	AWS-CWI, ICC-SWSI		X	Weekly.
	3. Environmental conditions				
X	a. Wind speed within limits	AWS-CWI, ICC-SWSI		X	Weekly.
X	b. Precipitation and temperature	AWS-CWI, ICC-SWSI		X	Weekly.

Required?	Structural Test or Special Inspection	Required Qualifications	Continuous	Periodic	Frequency of Periodic Test or Inspection
	4. WPS followed				
X	a. Settings on welding equipment	AWS-CWI, ICC-SWSI		X	Weekly.
X	b. Travel speed	AWS-CWI, ICC-SWSI		X	Weekly.
X	c. Selected welding materials	AWS-CWI, ICC-SWSI		X	Weekly.
X	d. Shielding gas type/flow rate	AWS-CWI, ICC-SWSI		X	Weekly.
X	e. Preheat applied	AWS-CWI, ICC-SWSI		X	Weekly.
X	f. Interpass temperature maintained (minimum/maximum)	AWS-CWI, ICC-SWSI		X	Weekly.
X	g. Proper position (F, V, H, OH)	AWS-CWI, ICC-SWSI		X	Weekly.
X	h. Intermix of filler metals avoided unless approved (reference: AISC 341-10 Table J6.2)	AWS-CWI, ICC-SWSI		X	Weekly.
X	5. Use of qualified welders	AWS-CWI, ICC-SWSI		X	Weekly.
	6. Welding techniques				
X	a. Interpass and final cleaning	AWS-CWI, ICC-SWSI		X	Weekly.
X	b. Each pass within profile limitations	AWS-CWI, ICC-SWSI		X	Weekly.
X	c. Each pass meets quality requirements	AWS-CWI, ICC-SWSI		X	Weekly.
	7. Placement and installation of headed stud anchors	AWS-CWI, ICC-SWSI			
	After Welding (AISC 360-16 Table N5.4-3)				
X	1. Welds cleaned	AWS-CWI, ICC-SWSI		X	Weekly.

Required?	Structural Test or Special Inspection	Required Qualifications	Continuous	Periodic	Frequency of Periodic Test or Inspection
X	2. Size, length and location of welds	AWS-CWI, ICC-SWSI	X		Weekly.
	3. Welds meet visual acceptance criteria				
X	a. Crack prohibition	AWS-CWI, ICC-SWSI	X		Weekly.
X	b. Weld/base-metal fusion	AWS-CWI, ICC-SWSI	X		Weekly.
X	c. Crater cross section	AWS-CWI, ICC-SWSI	X		Weekly.
X	d. Weld profiles	AWS-CWI, ICC-SWSI	X		Weekly.
X	e. Weld size	AWS-CWI, ICC-SWSI	X		Weekly.
X	f. Undercut	AWS-CWI, ICC-SWSI	X		Weekly.
X	g. Porosity	AWS-CWI, ICC-SWSI	X		Weekly.
X	4. Arc strikes	AWS-CWI, ICC-SWSI	X		Weekly.
X	5. k-area	AWS-CWI, ICC-SWSI	X		Weekly.
X	6. Weld access holes in rolled heavy shapes and built-up heavy shapes	AWS-CWI, ICC-SWSI	X		Weekly.
X	7. Backing removed and weld tabs removed (if required)	AWS-CWI, ICC-SWSI	X		Weekly.
X	8. Repair activities	AWS-CWI, ICC-SWSI	X		Weekly.
X	9. Document acceptance or rejection of welded joint or member	AWS-CWI, ICC-SWSI	X		Weekly.
X	10. No prohibited welds have been added without the approval of the EOR (Engineer of Record)	AWS-CWI, ICC-SWSI	X		Weekly.
X	11. Placement of reinforcing or contouring fillet welds (if required) (reference: AISC 341-16)	AWS-CWI, ICC-SWSI	X		Weekly.

Required?	Structural Test or Special Inspection	Required Qualifications	Continuous	Periodic	Frequency of Periodic Test or Inspection
	Nondestructive Testing (AISC 360-16 Section N5 and AISC 341-16 Section J6)				
X	1. Risk Category II Structures - Perform Ultrasonic Testing on 10% of CJP groove welds in butt, T- and corner joints subject to transversely applied tension loading, in materials 5/16 inch thick or greater.	ASNT-NDT II/III		X	Weekly.
	2. Risk Category III or IV Structures - Perform Ultrasonic Testing on all CJP groove welds subject to transversely applied tension loading in butt, T- and corner joints, in materials 5/16 inch thick or greater.				
	3. Access Holes – Perform Magnetic Particle Testing or Liquid Penetrant Testing when the flange thickness exceeds 2 inches for rolled shapes, or when the web thickness exceeds 2 inches for built-up shapes.				
	4. Welded Joints Subject to Fatigue	ASNT-NDT II/III			
	Nondestructive Testing (AISC 341-16 Section J6)				
	Column Splice and Column to Base Plate PJP Groove Weld (AISC 341-16 Section J6 2b)				
	1. Perform Ultrasonic Testing on 100% of PJP (partial-joint-penetration) groove welds in column splices and column to base plate welds	ASNT-NDT II/III			
	2. CJP Groove weld	ASNT-NDT II/III			
	3. Lamellar tearing	ASNT-NDT II/III			
	4. Beam cope and access hole	ASNT-NDT II/III			
	5. Reduced beam section repair	ASNT-NDT II/III			
	6. Weld tab removal	ASNT-NDT II/III			
	Prior to Bolting (AISC 360-16 Table N5.6-1)				
	These inspections are not required for snug-tight joints.				
X	1. Manufacturer's certifications available for fastener materials	ICC-SSBSI		X	Weekly.

Required?	Structural Test or Special Inspection	Required Qualifications	Continuous	Periodic	Frequency of Periodic Test or Inspection
X	2. Fasteners marked in accordance with ASTM requirements	ICC-SSBSI		X	Weekly.
X	3. Correct fasteners selected for the joint detail (grade, type, bolt length if threads are to be excluded from shear plane)	ICC-SSBSI		X	Weekly.
X	4. Correct bolting procedure selected for joint detail	ICC-SSBSI		X	Weekly.
X	5. Connecting elements, including the appropriate faying surface condition and hole preparation, if specified, meet applicable requirements	ICC-SSBSI		X	Weekly.
X	6. Pre-installation verification testing by installation personnel observed and documented for fastener assemblies and methods used	ICC-SSBSI		X	Weekly.
X	7. Protected storage provided for bolts, nuts, washers and other fastener components	ICC-SSBSI		X	Weekly.
During Bolting (AISC 360-16 Table N5.6-2)					
	These inspections are not required for snug-tight joints.				
	These inspections are not required for pretensioned joints and slip-critical joints, when the installer is using the turn-of-nut method with matchmarking techniques, the direct-tension-indicator method, or the twist-off-type tension control bolt method.				
X	1. Fastener assemblies, of suitable condition, placed in all holes and washers (if required) are positioned as required	ICC-SSBSI		X	Weekly.
X	2. Joint brought to the snug-tight condition prior to the pretensioning operation	ICC-SSBSI		X	Weekly.
X	3. Fastener component not turned by the wrench prevented from rotating	ICC-SSBSI		X	Weekly.
X	4. Fasteners are pretensioned in accordance with the RCSC (Resource Council on Structural Connections) Specification, progressing systematically from the most rigid point toward the free edges	ICC-SSBSI		X	Weekly.
After Bolting (AISC 360-16 Table N5.6-2)					
X	Document acceptance or rejection of bolted connections.	ICC-SSBSI		X	Weekly.

Required?	Structural Test or Special Inspection	Required Qualifications	Continuous	Periodic	Frequency of Periodic Test or Inspection
	Other Inspection Tasks (AISC 360-16 Section N5.7)				
X	1. Verify compliance of fabricated steel with the details shown on the approved shop drawings.	ICC-SSBSI		X	Weekly.
X	2. Verify compliance of the erected steel frame with the details shown on the approved erection drawings, including braces, stiffeners, member locations and joint details.	ICC-SSBSI		X	Weekly.
	3. Anchor rods and other embedments support structural steel				
X	a. Verify the diameter, grade, type and length of the anchor rod or embedded item.	ICC-SSBSI		X	Weekly.
X	b. Verify the extent or depth of embedment into the concrete.	ICC-SSBSI		X	Weekly.
	4. RBS (reduce beam section) requirements, if applicable (AISC 341-16)				
	a. Contour and finish				
	b. Dimensional tolerances				
X	5. Protected zone - no holes and unapproved attachments made by fabricator or erector, as applicable. (AISC 341-16)	ICC-SSBSI		X	Weekly.
	6. H-piles - Protected zone - no holes and unapproved attachments made by the responsible contractor, as applicable. (AISC 341-16)				
	Cold-formed Steel Deck (IBC-15 1705.2.2)				
	1. Special inspections in accordance with QA/QC-2017 Standard for Quality control (QC) and Quality assurance (QA) for Installation of Steel Deck				
	Open-Web steel Joists and Joist Girders (IBC-15 Table 1705.2.3)				
	1. Installation of open-web steel joists and joist girders.				
	a. End connections - welding or bolted				
	b. Bridging - horizontal or diagonal				

Required?	Structural Test or Special Inspection	Required Qualifications	Continuous	Periodic	Frequency of Periodic Test or Inspection
	1. Standard bridging				
	2. Bridging that differs from the SJI (Steel Joist Institute) specifications listed in Section 2207.1.				
Inspection of Composite Structures Prior to Concrete Placement (AISC 341-16 Table J9.1)					
	1. Material identification of reinforcing steel (Type/Grade)				
	2. Determination of carbon equivalent for reinforcing steel other than ASTM A706				
	3. Proper reinforcing steel size, spacing and orientation				
	4. Reinforcing steel has not been rebent in the field				
	5. Reinforcing steel has been tied and supported as required				
	6. Required reinforcing steel clearances have been provided				
	7. Composite member has required size				
Inspection of Composite Structures During Concrete Placement (AISC 341-16 Table J9.2)					
	1. Concrete: Material identification (mix design, compressive strength, maximum large aggregate size, maximum slump)				
	2. Limits on water added at the truck or pump				
	3. Proper placement techniques to limit segregation				
Inspection of Composite Structures During Concrete Placement (AISC 341-16 Table J9.2)					
	1. Achievement of minimum specified concrete compressive				
Cold-formed Steel Trusses Spanning 60-feet or Greater (IBC-15 Section 1705.2.4)					
	1. Verify temporary installation restraint/bracing installed in accordance with the approved shop drawings.				

Required?	Structural Test or Special Inspection	Required Qualifications	Continuous	Periodic	Frequency of Periodic Test or Inspection
	2. Verify permanent individual truss member restraint/bracing installed in accordance with the approved shop drawings.				
Concrete Construction (IBC-15 Section 1705.3)					
X	1. Inspect reinforcing steel, including prestressing tendons, and placement.	ICC-RCSI ACI-CCSI		X	Weekly.
	2. Inspection of reinforcing steel welding				
	a. Verify weldability of reinforcing bars other than ASTM A706.				
	b. Inspect single pass fillet welds, maximum 5/16 inch.				
	c. Inspect all other welds.				
X	3. Inspection of anchors cast in concrete.	ICC-RCSI ACI-CCSI		X	Weekly.
	4. Inspection of anchors post-installed in hardened concrete members.	ICC-RCSI ACI-CCSI			
	a. Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension load				
X	b. Mechanical anchors and adhesive anchors not defined in 4 a			X	Weekly.
X	5. Verify use of approved design mix.	ICC-RCSI ACI-CCSI ACI-FTT		X	Once per concrete pour.
X	6. Prior to placement fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	ACI-FTT		X	Once per concrete pour.
X	7. Inspect concrete and shotcrete placement for proper application techniques.	ICC-RCSI ACI-CCSI		X	Once per concrete pour.
X	8. Inspect for maintenance of specified curing temperature and techniques.	ICC-RCSI ACI-CCSI ACI-FTT		X	Once per concrete pour.

Required?	Structural Test or Special Inspection	Required Qualifications	Continuous	Periodic	Frequency of Periodic Test or Inspection
	9. Inspection of prestressed concrete:				
	a. Application of prestressing forces				
	b. Grouting of bonded prestressing tendons in the seismic-force-resisting system.				
	10. Erection of precast structural members				
	11. For precast concrete diaphragm connections or reinforcement at joints classified as moderate or high deformability elements (MDE or HDE) in structures assigned to Seismic Design Category C, D, E, or F, inspect such connections and reinforcement in the field for:				
	a. Installation of the embedded parts				
	b. Completion of the continuity of reinforcement across joints				
	c. Completion of connections in the field				
	12. Inspect installation tolerances of precast concrete diaphragm connections for compliance with ACI 550.5 (American Concrete Institute).				
X	13. 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.	ICC-RCSI ACI-CCSI		X	Once per element cast.
X	14. Inspection formwork for shape, location and dimensions of the concrete member being formed.	ICC-RCSI ACI-CCSI		X	Once per element cast.
Masonry Construction (IBC-15 Section 1705.4)					
X	1. Inspect masonry construction in accordance with IBC-15 Section 1705.4 and TMS 602-13 (The Masonry Society)/ACI 530.1-13 Article 1.6.	ICC-SMSI		X	Weekly.
Level A Quality Assurance					
	Tests: None.				
X	Inspection: Verify compliance with the approved submittal and project specifications.	ICC-SMSI		X	Weekly.

Required?	Structural Test or Special Inspection	Required Qualifications	Continuous	Periodic	Frequency of Periodic Test or Inspection
	Level B Quality Assurance				
	Tests:				
X	1. Verify slump flow and Visual Stability Index (VSI) as delivered to the project site in accordance with TMS 602-13/ACI 530.1-13 Specification Article 1.5B.1.b.3 for self-consolidating grout.	ICC-SMSI		X	Once per filling of holes.
X	2. Verify f'm and f'aac in accordance with TMS 602-13/ACI 530.1-13 Specification Article 1.4B prior to construction, except where specifically exempted.	ICC-SMSI		X	Once per batch.
	Inspection:				
X	1. Verify compliance with the approved submittals and project specifications.	ICC-SMSI		X	Weekly.
	2. At the start of masonry construction, verify:				
X	a. Proportions of site-prepared mortar.	ICC-SMSI		X	Once.
X	b. Construction of mortar joints.	ICC-SMSI		X	Once.
	c. Grade and size of prestressing tendons and anchorages.	ICC-SMSI			
X	d. Location of reinforcement, connectors, prestressing tendons and anchorages.	ICC-SMSI		X	Once.
	e. Prestressing technique.	ICC-SMSI			
	f. Properties of thin-bed mortar for AAC (autoclaved aerated concrete) masonry. (Continuous inspection is required for the first 5000 square feet of AAC masonry. Periodic inspection is required after the first 5000 square feet of AAC masonry.)	ICC-SMSI			
	3. Prior to grouting, verify:				
X	a. Grout space is clean.	ICC-SMSI		X	Once per filling of holes.
X	b. Grade, type and size of reinforcement and anchor bolts, and prestressing tendons and anchorages.	ICC-SMSI		X	Once per filling of holes.

Required?	Structural Test or Special Inspection	Required Qualifications	Continuous	Periodic	Frequency of Periodic Test or Inspection
X	c. Placement of reinforcing and connectors, and prestressing tendons and anchorages.	ICC-SMSI		X	Weekly.
	d. Proportions of site-prepared grout and prestressing grout for bonded tendons.	ICC-SMSI			
X	e. Construction of mortar joints.	ICC-SMSI		X	Weekly.
	4. During masonry construction, verify:				
X	a. Size and location of structural members.	ICC-SMSI		X	Weekly.
X	b. Type, size and location of anchors, including other details of anchorage of masonry to structural members, frames, or other construction.	ICC-SMSI		X	Weekly.
	c. Welding of reinforcement.	ICC-SMSI			
X	d. Preparation, construction and protection of masonry during cold weather (temperature below 40 degrees Fahrenheit) or hot weather (temperature above 90 degrees Fahrenheit).	ICC-SMSI		X	Weekly.
	e. Application and measurement of prestressing force.	ICC-SMSI			
	f. Placement of grout and prestressing grout for bonded tendons is in compliance.	ICC-SMSI			
	g. Placement of AAC masonry units and construction of thin-bed mortar joints. (Continuous inspection is required for the first 5000 square feet of AAC masonry. Periodic inspection is required after the first 5000 square feet of AAC masonry.)	ICC-SMSI			
X	5. Observe preparation of grout specimens, mortar specimens and/or prisms.	ICC-SMSI		X	Weekly.
	Level C Quality Assurance				
	Tests:				
	1. Verify f'_m and f'_{aac} in accordance with TMS 602-13/ACI 530.1-13/ASCE 6-13 Specification Article 1.4B prior to construction, and for every 5000 square feet during construction.				

Required?	Structural Test or Special Inspection	Required Qualifications	Continuous	Periodic	Frequency of Periodic Test or Inspection
	2. Verify proportions of materials in premixed or pre-blended mortar, prestressing grout, and grout other than self-consolidating grout as delivered to the project site.				
	3. Verify slump flow and Visual Stability Index (VSI) as delivered to the project site in accordance with TMS 602-13/ACI 530.1-13/ASCE 6-13 Specification Article 1.5B.1.b.3 for self-consolidating grout.				
	Inspection:				
	1. Verify compliance with the approved submittals and project specifications.				
	2. Verify:				
	a. Proportions of site-prepared mortar, grout and prestressing grout for bonded tendons.				
	b. Grade, type and size of reinforcement and anchor bolts, and prestressing tendons and anchorages.				
	c. Placement of masonry units and construction of mortar joints.				
	d. Placement of reinforcement, connectors and prestressing tendons and anchorages.				
	e. Grout space prior to grouting.				
	f. Placement of grout and prestressing grout for bonded tendons.				
	g. Size and location of structural elements.				
	h. Type, size and location of anchors, including other details of anchorage of masonry to structural members, frames or other construction.				
	i. Welding of reinforcement.				
	j. Preparation, construction and protection of masonry during cold weather (temperature below 40 degrees Fahrenheit) or hot weather (temperature above 90 degrees Fahrenheit).				

Required?	Structural Test or Special Inspection	Required Qualifications	Continuous	Periodic	Frequency of Periodic Test or Inspection
	k. Application and measurement of prestressing force.				
	l. Placement of AAC masonry units and construction of thin-bed mortar joints.				
	m. Properties of thin-bed mortar for AAC masonry.				
	3. Observe preparation of grout specimens, mortar specimens and/or prisms.				
Wood Construction (IBC-15 Section 1705.5)					
X	1. Inspect prefabricated wood structural elements in accordance with Section 1704.2.5.	ICC-CBI		X	Once.
	2. High load diaphragms:				
X	a. Verify sheathing grade and thickness.	ICC-CBI		X	Once.
X	b. Verify nominal size of framing members at adjoining panel edges.	ICC-CBI		X	Once.
X	c. Verify nail or staple diameter and length.	ICC-CBI		X	Once.
X	d. Verify number of fastener lines.	ICC-CBI		X	Once.
X	e. Verify spacing between fasteners in each line and at panel edges.	ICC-CBI		X	Once.
	3. Shearwalls:				
	a. Verify sheathing grade and thickness.				
	b. Verify nominal size of framing members at adjoining panel edges.				
	c. Verify nail or staple diameter and length.				
	d. Verify number of fastener lines.				
	e. Verify spacing between fasteners in each line and at panel edges.				
	f. Location and size of holdowns.				
	4. Verify nailing, bolting, anchoring and fastening of:				

Required?	Structural Test or Special Inspection	Required Qualifications	Continuous	Periodic	Frequency of Periodic Test or Inspection
X	a. Drag struts and collectors.	ICC-CBI		X	Once.
X	b. Braces.	ICC-CBI		X	Once.
X	c. Hold-downs.	ICC-CBI		X	Once.
	5. Metal-plate-connected wood trusses spanning 60 feet or greater:				
	a. Verify temporary installation restraint/bracing installed in accordance with the approved shop drawings.				
	b. Verify permanent individual truss member restraint/bracing installed in accordance with the approved shop drawings.				
Soils (IBC-15 Section 1705.6)					
	1. Verify materials below shallow foundations are adequate to achieve the required bearing capacity.				
	2. Verify excavations are extended to proper depth and have reached proper material.				
	3. Perform classification and testing of compacted fill materials.				
	4. During fill placement, verify use of proper materials and procedure in accordance with the provisions of the approved geotechnical report. Verify densities and lift thicknesses during placement and compaction of compacted fill.				
	5. Prior to placement of compacted fill, inspect subgrade and verify that site has been prepared properly.				
Driven Deep Foundation Elements (IBC-15 Section 1705.7)					
	1. Verify element materials, sizes and lengths.				
	2. Determine capacities of test elements and conduct additional load tests when required. Refer to project specifications.				

Required?	Structural Test or Special Inspection	Required Qualifications	Continuous	Periodic	Frequency of Periodic Test or Inspection
	3. Inspect driving operations and maintain complete and accurate records for each element.				
	4. Verify element locations and plumbness.				
	a. Verify type and size of hammer.				
	b. Record number of blows per foot of penetration.				
	c. Determine required penetration to achieve specified capacity.				
	d. Record pile tip and butt elevations.				
	e. Document any damage to any foundation element.				
	5. For steel piling, perform additional inspection in accordance with Section 1705.2 and AISC 341-16, Table J10.1.				
	6. For concrete elements and concrete-filled elements, perform additional inspections in accordance with Section 1705.3.				
	7. For specialty elements, perform additional inspections as required in the project specifications.				
Cast-in-Place Deep Foundation (IBC-15 Section 1705.8)					
	1. Inspect drilling operations and maintain complete and accurate records for each element.				
	2. Verify element locations and plumbness.				
	a. Verify element diameter.				
	b. Verify bell diameter (if applicable).				
	c. Verify element lengths.				
	d. Verify embedment depth into bedrock (if applicable).				
	e. Verify adequate end-bearing strata capacity.				

Required?	Structural Test or Special Inspection	Required Qualifications	Continuous	Periodic	Frequency of Periodic Test or Inspection
	f. Record concrete or grout volumes.				
	3. For concrete elements, perform additional inspections in accordance with Section 1705.3.				
Helical Piles (IBC-15 Section 1705.10)					
	1. Verify pile locations.				
	a. Verify installation equipment used.				
	b. Verify pile dimensions.				
	c. Verify tip elevations.				
	d. Verify final depth.				
	e. Verify final installation torque.				
	f. Other data as required by the project specifications.				
Fabricated Items (IBC-15 Section 1705.11)					
	1. Inspect fabricated items in accordance with Section 1704.2.5.				
Wind Resistance (IBC-15 Section 1705.12)					
X	1. Provide inspections when required by Section 1705.12.	PE/SE		X	Once.
Seismic Resistance (IBC-15 Section 1705.13)					
	1. Provide inspections when required by Section 1705.13.				
Testing and Qualification for Seismic Resistance (IBC-15 Section 1705.14)					
	1. Test and qualify seismic resistance in accordance with IBC-15 Section 1705.14 and the project specifications.				

Required?	Structural Test or Special Inspection	Required Qualifications	Continuous	Periodic	Frequency of Periodic Test or Inspection
Sprayed Fire-Resistant Materials (IBC-15 Section 1705.15)					
	1. Inspect sprayed fire-resistant materials in accordance with IBC-15 Section 1705.15 and the project specifications.				
Mastic and Intumescent Fire-Resistant Coatings (IBC-15 Section 1705.16)					
	1. Perform inspections in accordance with AWCI 12-B (Association of the Wall and Ceiling Industry) and IBC-15 Section 1705.16.				
Exterior Insulation and Finish Systems (EIFS) (IBC-15 Section 1705.17)					
	1. Perform inspections in accordance with project specifications and IBC-15 Section 1705.17.				
Fire-Resistant Penetrations and Joints (IBC-15 Section 1705.18)					
	1. Perform inspections in accordance with project specifications and IBC-15 Section 1705.18.				
Smoke Control (IBC-15 Section 1705.19)					
	1. Perform testing in accordance with project specifications and IBC-15 Section 1705.19.				
Sealing of Mass Timber (IBC-15 Section 1705.20)					
	1. Perform testing in accordance with project specifications and IBC-15 Section 1705.20.				

SECTION 01 42 00 – REFERENCE STANDARDS

PART 1 - GENERAL

1.1 ENVIRONMENTAL DEFINITIONS

- A. Definitions pertaining to sustainable development: As defined in ASTM E2114 and as specified herein.
- B. Biobased Materials: As defined in the Farm Security and Rural Investment Act, for purposes of Federal procurement of biobased products, "biobased" means a "commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials." Biobased materials also include fuels, chemicals, building materials, or electric power or heat produced from biomass as defined by The Biomass Research and Development Act of 2000.
 - 1. Biobased content: Amount of biobased carbon in the material or product as a percentage of weight (mass) of total organic carbon in the material or product.
- C. Chain-of-Custody: Process whereby a product or material is maintained under physical possession or control during its entire life cycle.
- D. Deconstruction: Disassembly of buildings for purpose of recovering materials.
- E. DFE (Design for the Environment): A technique that includes elements of resource conservation and pollution prevention as applied in various product sectors. A technique that incorporates approaches which are part of product (or assembly) concept, need and design. Considerations involve material selection, material and energy efficiency, reuse, maintainability and design for disassembly and recyclability. Refer to International Organization for Standardization (ISO) Guide 64 for additional clarification.
- F. Environmentally preferable products: Products and services that have a lesser or reduced effect on the environment in comparison to conventional products and services. Refer to EPA's Final Guidance on [Environmentally Preferable Purchasing Program](#).
- G. Non-Renewable Resource: A resource that exists in a fixed amount that cannot be replenished on a human time scale. Non-renewable resources have potential for renewal only by geological, physical, and chemical processes taking place over of millions of years. Examples include iron ore, coal, and oil.
- H. Perpetual Resource: A resource that is virtually inexhaustible on a human time scale. Examples include solar energy, tidal energy, and wind energy.
- I. Recycled Content Materials: Products that contain pre-consumer or post-consumer materials as all or part of their feedstock. Recycled content claim shall be consistent Federal Trade Commission (FTC) Guide for Use of Environmental Marketing Claims.

- J. Renewable Resource: A resource that is grown, naturally replenished, or cleansed, at a rate which exceeds depletion of the usable supply of that resource. A renewable resource can be exhausted if improperly managed. However, a renewable resource can last indefinitely with proper stewardship. Examples include trees in forests, grasses in grasslands, and fertile soil.

1.2 QUALITY ASSURANCE

- 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 Contract Documents to the extent referenced. Such standards are made a part of Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of Contract Documents, unless otherwise indicated.
- C. Conflicting Requirements: Where compliance with two or more standards is specified, and standards may establish different or conflicting requirements for minimum quantities or quality levels, comply with most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Contracting Officer (CO) for decision before proceeding.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless Contract Documents include more stringent requirements, applicable construction industry standards have same force and effect as if bound or copied directly into Contract Documents to the extent referenced. Such standards are made a part of Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of Contract Documents unless otherwise indicated.
- C. 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 Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 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 found in Section 01 42 00 Sources for Reference Publications, [Unified Facilities Guide Specifications](#) (UFGS) (accessible via [Masters](#) website > Downloads section > click on UFGS Master (WBDG Website). Names, telephone numbers, and websites are subject to change and are believed to be accurate and up-to-date as of date of Contract Documents.

XX EXAMPLE Association (The)
 www.EXAMPLE.org

- 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 following list. Names, telephone numbers, and websites are subject to change and are believed to be accurate and up-to-date as of date of Contract Documents.

ICC	International Code Council www.iccsafe.org	(888) 422-7233
ICC-ES	ICC Evaluation Service, Inc. icc-es.org	(800) 423-6587 (562) 699-0543

- 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 following list. Names, and websites are subject to change and are believed to be accurate and up-to-date as of date of Contract Documents.

ABA & ABAAS United States Access Board	Architectural Barriers Act (ABA) Architectural Barriers Act Accessibility Standards (ABAAS) www.access-board.gov	
CoE	Army Corps of Engineers www.usace.army.mil	
CPSC	Consumer Product Safety Commission www.cpsc.gov	
DOC	Department of Commerce www.commerce.gov	
DOD	Department of Defense www.defense.gov	
DOJ	Department of Justice www.justice.gov	
DOE	Department of Energy www.energy.gov	
EPA	Environmental Protection Agency www.epa.gov	
FAA	Federal Aviation Administration www.faa.gov	
FCC	Federal Communications Commission	

www.fcc.gov

FDA	Food and Drug Administration www.fda.gov
GSA	General Services Administration www.gsa.gov
HUD	Department of Housing and Urban Development www.hud.gov
LBL	Lawrence Berkeley National Laboratory www.lbl.gov
NCHRP	National Cooperative Highway Research Program (See TRB (Transportation Resource Board))
NIST	National Institute of Standards and Technology www.nist.gov
OSHA	Occupational Safety & Health Administration www.osha.gov
PHS	U.S. Department of Health and Human Services www.hhs.gov
RUS	Rural Utilities Service (See USDA (Department of Agriculture))
SD	State Department www.state.gov
TRB	Transportation Research Board www.nationalacademies.org/trb/transportation-research-board
USDA	Department of Agriculture www.usda.gov
USP	U.S. Pharmacopeia www.usp.org
USPS	Postal Service www.usps.com

- D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in following list. Names, telephone numbers, and websites are subject to change and are believed to be accurate and up-to-date as of date of Contract Documents.

ABAAS	Architectural Barriers Act Accessibility Standards www.access-board.gov
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CFR	Code of Federal Regulations Available from Government Printing Office www.govinfo.gov/app/collection/cfr
DOD	Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point www.dsp.dla.mil/Specs-Standards/
DSCC	Defense Supply Center Columbus (See FS (Federal Specification))
FED-STD	Federal Standard (See FS (Federal Specification))
FS	Federal Specification Available from Department of Defense Single Stock Point www.dsp.dla.mil/Specs-Standards/ Available from General Services Administration www.gsa.gov Available from National Institute of Building Sciences www.nibs.org
FTMS	Federal Test Method Standard (See FS (Federal Specification))
MIL	(See MILSPEC (Military Specification and Standards))
MIL-STD	(See MILSPEC (Military Specification and Standards))
MILSPEC	Military Specification and Standards Available from Department of Defense Single Stock Point www.dsp.dla.mil/Specs-Standards/
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-aba-standards/ufas (UFAS is only for housing projects per Fair Housing Act. See also the Fair Housing Act Design Manual, www.huduser.gov/portal/publications/destech/fairhousing)

1.5 ENVIRONMENTAL REFERENCE STANDARDS

A. American Forest and Paper Association:

1. Sustainable Forestry Initiative

B. American Society of Heating Refrigerating and Air Conditioning Engineers (ASHRAE):

- **ASHRAE 52.2**, *Method of Testing General Ventilation Air Cleaning Devices for Removal Efficiency by Particle Size*

- **ASHRAE 55**, *Thermal Environmental Conditions for Human Occupancy*
 - **ASHRAE 62.1**, *Ventilation for Acceptable Indoor Air Quality*
 - **ASHRAE 62.2**, *Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings*
 - **ASHRAE/IESNA 90.1**, *Energy Standard for Buildings, Except Low-Rise Residential Buildings*
 - **ASHRAE 90.2**, *Energy Efficient Design of Low-Rise Residential Buildings*
- C. American Association of State Highway and Transportation Officials (AASHTO):
- M288 Geotextile Specification for Highway Applications
 - **MP009-06 Standard Specification for Compost for Erosion/Sediment Control (Filter Berms and Filter Socks)**
 - **MP010-03 Standard Specification for Compost for Erosion/Sediment Control (Compost Blankets)**
- D. American Society for Testing and Materials International (ASTM):
- A478 Standard Specification for Chromium-Nickel Stainless Steel Weaving and Knitting Wire
 - A580/A580M Standard Specification for Stainless Steel Wire
 - A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - B813 Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube
 - C1240 Standard Specification for Silica Fume Used in Cementitious Mixtures
 - C128 Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
 - C131 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 - C1319 Standard Specification for Concrete Grid Paving Units
 - C1338 Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings
 - C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
 - C1371 Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers
 - C1386 Standard Specification for Precast Autoclaved AERATED Concrete (PAAC) Wall Construction Units
 - C1483 Standard Specification for Exterior Solar Radiation Control Coatings on Buildings
 - C1549 Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer
 - C1601 Standard Test Method for Field Determination of Water Penetration of Masonry Wall Surfaces
 - C289 Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)
 - C311 Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete
 - C33 Standard Specification for Concrete Aggregates
 - C593 Standard Specification for Fly Ash and Other Pozzolans for Use With Lime
 - C595 Standard Specification for Blended Hydraulic Cements

- C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
- C67 Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
- C739 Standard Specification for Cellulosic Fiber (Wood-Base) Loose-Fill Thermal Insulation
- C936 Standard Specification for Interlocking Concrete Paver Units
- C989 Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
- D1435 Standard Practice for Outdoor Weathering of Plastics
- D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 foot pound force per cubic foot (ft-lbf/ft³) (2,700 kilonewton meter per cubic meter (kN-m/m³))
- D1972 Standard Practice for Generic Marking of Plastic Products
- D198 Standard Test Methods of Static Tests of Lumber in Structural Sizes
- D2103 Standard Specification for Polyethylene Film and Sheeting
- D217 Standard Test Methods for Cone Penetration of Lubricating Grease
- D2369 Standard Test Method for Volatile Content of Coatings
- D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- D3786 Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method
- D3792 Standard Test Method for Water Content of Coatings by Direct Injection Into a Gas Chromatograph
- D3864 Standard Guide for Continual On-Line Monitoring Systems for Water Analysis
- D3960 Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
- D4017 Standard Test Method for Water in Paints and Paint Materials by Karl Fischer Method
- D4263 Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
- D4444 Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters
- D4491 Standard Test Methods for Water Permeability of Geotextiles by Permittivity
- D4552 Standard Practice for Classifying Hot-Mix Recycling Agents
- D4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
- D4716 Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
- D4833 Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Product
- D4840 Standard Guide for Sampling Chain-of-Custody Procedures
- D4887 Standard Test Method for Preparation of Viscosity Blends for Hot Recycled Bituminous Materials
- D5106 Standard Specification for Steel Slag Aggregates for Bituminous Paving Mixtures
- D5116 Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products
- D5199 Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
- D5261 Standard Test Method for Measuring Mass per Unit Area of Geotextiles
- D5268 Standard Specification for Topsoil Used for Landscaping Purposes
- D5359 Standard Specification for Glass Cullet Recovered from Waste for Use in Manufacture of Glass Fiber

- D5505 Standard Practice for Classifying Emulsified Recycling Agents
- D5509 Standard Practice for Exposing Plastics to a Simulated Compost Environment
- D5512 Standard Practice for Exposing Plastics to a Simulated Compost Environment Using an Externally Heated Reactor
- D5539 Standard Specification for Seed Starter Mix
- D5957 Standard Guide for Flood Testing Horizontal Waterproofing Installations
- D5603 Standard Classification for Rubber Compounding Materials—Recycled Vulcanizate Particulate Rubber
- D5663 Standard Guide for Validating Recycled Content in Packaging Paper and Paperboard
- D5759 Standard Guide for Characterization of Coal Fly Ash and Clean Coal Combustion Fly Ash for Potential Uses
- D5792 Standard Practice for Generation of Environmental Data Related to Waste Management Activities: Development of Data Quality Objectives
- D5834 Standard Guide for Source Reduction Reuse, Recycling, and Disposal of Solid and Corrugated Fiberboard (Cardboard)
- D5851 Standard Guide for Planning and Implementing a Water Monitoring Program
- D5852 Standard Test Method for Erodibility Determination of Soil in the Field or in the Laboratory by the Jet Index Method
- D6002 Standard Guide for Assessing the Compostability of Environmentally Degradable Plastics
- D6006 Standard Guide for Assessing Biodegradability of Hydraulic Fluid
- D6007 Standard Test Method for Determining Formaldehyde Concentration in Air from Wood Products Using a Small Scale Chamber
- D6046 Standard Classification of Hydraulic Fluids for Environmental Impact
- D6081 Standard Practice for Aquatic Toxicity Testing of Lubricants: Sample Preparation and Results Interpretation
- D6108 Standard Test Method for Compressive Properties of Plastic Lumber and Shapes
- D6109 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic Lumber
- D6112 Standard Test Methods for Compressive and Flexural creep and Creep-Rupture of Plastic Lumber and Shapes
- D6117 Standard Test Methods for Mechanical Fasteners In Plastic Lumber and Shapes
- D6155 Standard Specification for Nontraditional Coarse Aggregates for Bituminous Paving Mixtures
- D6245 Standard Guide for Using Indoor Carbon Dioxide Concentrations to Evaluate Indoor Air Quality and Ventilation
- D6261 Standard Specification for Extruded and Compression Molded Basic Shapes Made from Thermoplastic Polyester (TPES)
- D6262 Standard Specification for Extruded, Compression Molded, and Injection Molded Basic Shapes of Poly(aryl ether ketone) (PAEK)
- D6270 Standard Practice for Use of Scrap Tires in Civil Engineering Applications
- D6329 Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers
- D6330 Standard Practice for Determination of Volatile Organic Compounds (Excluding Formaldehyde) Emissions from Wood-Based Panels Using Small Environmental Chambers Under Defined Test Conditions
- D6345 Standard Guide for Selection of Methods for Active, Integrative Sampling of Volatile Organic Compounds in Air

- D6400 Standard Specification for Compostable Plastics
- D6435 Standard Test Method for Shear Properties of Plastic Lumber and Plastic Lumber Shapes
- D6629 Standard Guide for Selection of Methods for Estimating Soil Loss by Erosion
- D6662 Standard Specification for Polyolefin-Based Plastic Lumber Decking Boards
- D6712 Standard Specification for Ultra-High-Molecular-Weight Polyethylene (UHMW-PE) Solid Plastic Shapes
- D6886 Standard Test Method for Speciation of the Volatile Organic Compounds (VOCs) in Low VOC Content Waterborne Air-Dry Coatings by Gas Chromatography
- D692 Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures
- D696 Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C With a Vitreous Silica Dilatometer
- D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³))
- D7186 Standard Practice for Quality Assurance Observation of Roof Construction and Repair
- E1021 Standard Test Methods for Measuring Spectral Response of Photovoltaic Cells
- E1038 Standard Test Method for Determining Resistance of Photovoltaic Modules to Hail by Impact with Propelled Ice Balls
- E1039 Standard Test Method for Calibration of Silicon Non-Concentrator Photovoltaic Primary Reference Cells Under Global Irradiation
- E1040 Standard Specification for Physical Characteristics of Nonconcentrator Terrestrial Photovoltaic Reference Cells
- E1105 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference
- E1171 Standard Test Method for Photovoltaic Modules in Cyclic Temperature and Humidity Environments
- E1333 Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Under Defined Test Conditions Using a Large Chamber
- E1362 Standard Test Method for Calibration of Non-Concentrator Photovoltaic Secondary Reference Cells
- E1433 Standard Guide for Selection of Standards on Environmental Acoustics
- E1462 Standard Test Methods for Insulation Integrity and Ground Path Continuity of Photovoltaic Modules
- E1596 Standard Test Methods for Solar Radiation Weathering of Photovoltaic Modules
- E1597 Standard Test Method for Saltwater Pressure Immersion and Temperature Testing of Photovoltaic Modules for Marine Environments
- E1609 Standard Guide for Development and Implementation of a Pollution Prevention Program
- E1686 Standard Guide for Selection of Environmental Noise Measurements and Criteria
- E1690 Standard Test Method for Determination of Ethanol Extractives in Biomass
- E1721 Standard Test Method for Determination of Acid-Insoluble Residue in Biomass
- E1755 Standard Test Method for Ash in Biomass
- E1758 Standard Test Method for Determination of Carbohydrates in Biomass by High Performance Liquid Chromatography
- E1780 Standard Guide for Measuring Outdoor Sound Received from a Nearby Fixed Source

- E1799 Standard Practice for Visual Inspections of Photovoltaic Modules
- E1802 Standard Test Methods for Wet Insulation Integrity Testing of Photovoltaic Modules
- E1821 Standard Test Method for Determination of Carbohydrates in Biomass by Gas Chromatography
- E1827 Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door
- E1830 Standard Test Methods for Determining Mechanical Integrity of Photovoltaic Modules
- E1861 Standard Guide for Use of Coal Combustion By-Products in Structural Fills
- E1918 Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field
- E1971 Standard Guide for Stewardship for the Cleaning of Commercial and Institutional Buildings
- E1980 Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces
- E1991 Standard Guide for Environmental Life Cycle Assessment of Building Materials/Products
- E2047 Standard Test Method for Wet Insulation Integrity Testing of Photovoltaic Arrays
- E2114 Standard Terminology for Sustainability Relative to the Performance of Buildings
- E2128 Standard Guide for Evaluating Water Leakage of Building Walls
- E2129 Standard Practice for Data Collection for Sustainability Assessment of Building Products
- E2397 Standard Practice for Determination of Dead Loads and Live Loads associated with Green Roof Systems
- E2398 Standard Test Method for Water Capture and Media Retention of Geocomposite Drain Layers for Green Roof Systems
- E2399 Standard Test Method for Maximum Media Density for Dead Load Analysis of Green Roof Systems
- E2400 Standard Guide for Selection, Installation, and Maintenance of Plants for Green Roof Systems
- E241 Standard Guide for Limiting Water-Induced Damage to Buildings
- E2432 Standard Guide for General Principles of Sustainability Relative to Buildings
- E408 Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques
- E413 Standard Classification for Rating Sound Insulation
- E477 Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers
- E648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
- E683 Standard Practice for Installation and Service of Solar Space Heating Systems for One- and Two-Family Dwellings
- E779 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
- E781 Standard Practice for Evaluating Absorptive Solar Receiver Materials When Exposed to Conditions Simulating Stagnation in Solar Collectors With Cover Plates
- E782 Standard Practice for Exposure of Cover Materials for Solar Collectors to Natural Weathering Under Conditions Simulating Operational Mode
- E823 Standard Practice for Nonoperational Exposure and Inspection of a Solar Collector

- E881 Standard Practice for Exposure of Solar Collector Cover Materials to Natural Weathering Under Conditions Simulating Stagnation Mode
 - E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
 - E903 Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres
 - E948 Standard Test Method for Electrical Performance of Photovoltaic Cells Using Reference Cells Under Simulated Sunlight
 - F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
 - F2034 Standard Specification for Sheet Linoleum Floor Covering
 - F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
- E. Bat Conservation International:
- Bat Approved Bat Houses
- F. Carpet and Rug Institute
- Green Label & Green Label Plus Testing Programs, carpet-rug.org/testing/green-label-plus
- G. Center for Resource Solutions
- Green-e program
- H. Environmental Protection Agency (EPA):
- **Comprehensive Procurement Guidelines**
 - **ENERGY STAR**
 - **Environmentally Preferable Purchasing Program Final Guidance**
 - **GreenScapes program**
 - **Heat Island Initiative**
 - **Indoor Air Quality Building Education and Assessment Model (I-BEAM)**
 - **National Environmental Performance Track**
 - **Pollution Prevention (P2)**
 - **Product Stewardship Program**
 - **Significant New Alternatives Policy (SNAP) Program**
- I. Federal Trade Commission:
- **Guide for the Use of Environmental Marketing Claims**
- J. Forest Stewardship Council:
- **Chain-Of-Custody**
 - **Forest Management**
- K. Green Building Initiative (GBI):
- **Green Globes - US**
- L. Green Seal:
- **GC-03 Anti-Corrosive Paints**
 - **GC-12 Occupancy Sensors**

- **GC-13 Split-Ductless Air-Source Heat Pumps**
 - **GS-05 Compact Fluorescent Lamps**
 - **GS-11 Paints**
 - **GS-13 Windows**
 - **GS-14 Window Films**
 - **GS-31 Electric Chillers**
 - **GS-32 Photovoltaic Modules**
 - **GS-36 Commercial Adhesives**
 - **GS-37 Industrial & Institutional Cleaners**
- M. International Iron and Steel Institute:
- **CO2 Breakthrough Program**
- N. International Organization of Standardization:
- **Guide 64; Guide for Inclusion of Environmental Aspects in Product Standards**
 - **9660 Information processing -- Volume and file structure of CD-ROM for information interchange**
 - **14001 Environmental management systems – Specification with guidance for use**
 - **14004 Environmental Management Systems – General Guidelines on Principles, Systems and Supporting Techniques**
 - **14020 Environmental labels and declarations – General principles**
 - **14024 Environmental labels and declarations – Type I environmental labelling - Principles and procedures**
 - **14040 Environmental management – Life cycle assessment – Principles and framework**
- O. National Association of Home Builders:
- **Advanced Framing Techniques: Optimum Value Engineering**
- P. National Institute of Building Sciences:
- **MOIST program for transfer of heat and moisture**
 - **Whole Building Design Guide**
- Q. National Institute of Standards and Technology:
- **BEES (Building for Environmental and Economic Sustainability) Lifecycle Decision Support Tool**
- R. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):
- **IAQ Guidelines for Occupied Buildings Under Construction**
- S. Southcoast Air Quality Management District:
- **1168 Adhesive And Sealant Applications**
- T. US Composting Council:
- **Seal of Testing Assurance Program**
- U. US Department of Agriculture:
- **Biobased Products – Definitions and Descriptions**
- V. US Green Building Council:

- **LEED™ 2009 Green Building Rating System**
- **LEED™ v4 (version 4) Green Building Rating System**

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.2 DEFINITIONS

- A. Permanent Enclosure: As determined by Contracting Officer (CO), permanent or temporary roofing is complete, insulated, and weather tight; exterior walls are insulated and weather tight; and openings are closed with permanent construction or substantial temporary closures.

1.3 USE CHARGES

- A. General: Cost or use charges for temporary facilities shall be included in Contract Sum as required. No cost should be anticipated for water pulled from Cape Lookouts water system. Power and water provided by contractor shall be included in contract sum.
- B. Water Service: Cape Lookout maintains their own treated water system, in the form of a well and holding tank, on a site adjacent to the lighthouse. If the general contractor or any subcontractor will want to utilize water from this source, the following stipulations will be required to be followed:
 - 1. GC to provide their own water-holding tank for use, to be located inside of the general contractors site fence. NPS to have first priority over water prior to diverting water to the general contractor's water tank.
 - 2. The GC shall request use and provide a water use plan on weeks where anticipated water usage is noted to be above 1,000 gallons per day.
 - 3. The well is not operable due to freezing temperatures during late December through middle of March, GC will have to provide their own water source during this time.
- C. Electric Power Service: Electric power from existing system is NOT available for use. General Contractor will be required to provide their own power sources.

1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with National Electrical Contractors Association (NECA), National Electrical Manufacturers Association (NEMA), and Underwriter Laboratories (UL) standards and regulations for temporary electric service. Install service to comply with National Fire Protection Association (NFPA) 70.
- B. Environmental Protection: Provide environmental protection as required by agency(ies) with jurisdiction and as indicated in Contract Documents. Coordinate with requirements of the following:

1. Regulatory Requirements
 2. Indoor Air Quality (IAQ) Management
 3. Noise and Acoustics Management
 4. Environmental Management
 5. Construction Waste Management
- C. Accessible Temporary Egress: Comply with applicable provisions in the United States (U.S.) Architectural & Transportation Barriers Compliance Board's Architectural Barriers Act Accessibility Standard (ABAAS) Accessibility Guidelines.

1.5 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Temporary materials may be new or used, but must be adequate in capacity for required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.
- B. Portable Chain-Link Fencing: Minimum 2 inch (50 millimeters), 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 millimeters) high with galvanized steel pipe posts; minimum 2-3/8 inch (60 millimeters) OD line posts and 2-7/8 inch (73 millimeters) OD corner and pull posts, with 1-5/8 inch (42 millimeters) OD top and bottom rails. Provide galvanized steel bases for supporting posts.
- C. Barrier Tape: Yellow tape Imprinted with "CAUTION: CONSTRUCTION AREA," manufactured by Reef Industries, Inc., Houston, Texas, or approved equal.
- D. 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.
- E. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10 mil (0.25-millimeter) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- F. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches (914 by 1624 millimeters).

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

- B. Contracting Officers Field Office: Field office shall be a separate structure from Contractor's office.
 - 1. Prefabricated, job built, or a mobile unit; excellent condition, structurally sound, non-flammable exterior construction, weather tight, minimum 300 square feet.
 - 2. Operable windows and security screens, adjustable ventilation.
 - 3. Restroom (minimum of lavatory and toilet, with exhaust fan if room is windowless).
 - 4. Air conditioner and heater.
 - 5. Interior partition with lockable door to divide office
 - 6. Paneling or freshly painted walls, acoustical tile or painted ceilings, and resilient flooring.
 - 7. Two exterior doors with dead bolts keyed from outside,
 - 8. Minimum 20-square-foot landing and steps at each exterior door.
- C. Storage and Fabrication Sheds: Temporary weather tight sheds or other covered facilities for storage of materials subject to weather damage. Number and size of structures shall be subject to Contracting Officer's approval.
- D. Toilets: Sufficiently lighted and ventilated toilet facilities in weatherproof, sight proof, handicap accessible, sturdy enclosures with privacy locks.
 - 1. Provide separate toilet facilities for men and women.
 - 2. GC shall be responsible for the maintenance and upkeep of the toilets
 - 3. GC shall not utilize NPS facilities

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. Heating, Ventilation, and Air Conditioning (HVAC) Equipment: Unless Contracting Officer authorizes use of permanent HVAC system, 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 testing agency acceptable to agency(ies) with jurisdiction, and marked for intended use.
 - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with Minimum Efficiency Reporting Value (MERV) of 8 at each return air grille in system and remove at end of construction.
- C. Contracting Officers Field Office
 - 1. Outlets: Minimum of two, quad outlets with surge protection.
 - 2. Refrigerator: Under counter, 3.2-cubic-foot volume with 0.8-cubic-foot freezer with dedicated power receptacle.
 - 3. Fire Extinguisher: UL listed and FM (Fire Pump Motors) approved, minimum rating of 2-A:10-B:C, dry chemical.

4. First-Aid Kit: General office/light industrial kit which includes antiseptic wipes, bandages, disposable gloves, tape, instant cold pack, dressing pads, eye pads, scissors, and Tylenol tablets. Provide small size, such as manufactured by Johnson & Johnson, New Brunswick, New Jersey, or approved equal.
5. Two desks with five drawers each and two chairs with casters; two drafting tables (minimum 40 inches wide by 5 feet long) and two stools; drawing rack; two 2-drawer and one 4-drawer legal size locking filing cabinets with keys; 8 feet of 12 inch deep shelving; coat rack; two additional guest chairs; two desk lamps; two drafting table lamps; and a maximum/minimum thermometer.
6. Manufactured computer work station, capable of containing CPU (central processing unit), monitor, keyboard, printer; work station chair.
7. Additional tables necessary for FAX machine and copier.
8. Two 5-gallon trash cans and one 30-gallon trash can with lid.
9. Ceiling mounted general lighting fixtures.

PART 3 - EXECUTION

3.1 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 and as directed by the Contracting Officer.
- 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.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 1. Arrange with utility company, NPS, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services. Acquire necessary permits.
- B. Potable water is available on site for most of the year. Make connections to existing facilities as needed. Facilities must be cleaned and maintained in a condition acceptable to NPS. At Substantial Completion, restore these facilities to condition existing before initial use.
- C. Potable water is not available on site for a portion of the year. Furnish cool, potable water for construction personnel in locations convenient to work stations.
- D. Sanitary Facilities: Provide temporary toilets, and wash facilities for use by construction personnel.
 1. Place in approved locations secluded from public observation and convenient to work stations. Relocate as work progress requires.
 2. Maintain and clean toilet facilities at least weekly.

3. Completely remove sanitary facilities on completion of work.
- E. 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.
- F. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
- G. 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.
- H. Telephone Service: No telephone service is available on site for Contractor's use. Make arrangements with Telephone Company and pay costs.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 50 feet of building lines. Comply with NFPA 241.
 2. Maintain support facilities until near Substantial Completion. Remove structures, equipment, and furnishings, and terminate services after punch list is 100 percent completed or when directed by Contracting Officer. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Contracting Officer.
- B. Contracting Officers Field Office:
 1. Provide Heat, lights, power, air conditioning, temporary water pressure and sewage holding tanks.
 2. Provide office, furnishings, and utility connections no later than 7 days after date of Notice to Proceed. Exact location will be determined by Contracting Officer.
 3. Maintain equipment, furnishings, and structures. Provide equipment replacement elements as needed. Provide weekly cleaning services and trash disposal. Maintain and service water and sewer holding tanks as required.
- C. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.
 1. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.

- D. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas in same location as permanent roads and paved areas. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 31 Section "Earth Moving."
 3. Recondition base after temporary use, including removing contaminated material, regrading, proof-rolling, compacting, and testing.
 4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 32 Section "Asphalt Paving."
- E. Traffic Controls: Erect and maintain barricades, lights, danger signals, and warning signs in accordance with Manual on Uniform Traffic Control Devices (MUTCD), Part IV, latest edition.
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. Illuminate barricades and obstructions at night; keep safety lights burning from sunset to sunrise.
 4. Adequately barricade and post open cuts in or adjacent to thoroughfares.
 5. Protect pedestrian traffic by guardrails or fences.
 6. When pedestrian traffic is detoured onto a roadway, provide temporary walkways with protection as required at ends and overhead. For walkways, use lumber running parallel to direction of traffic movement and provide ramps at changes of elevation.
 7. Cover pipes, hoses, and power lines crossing sidewalks and walkways with troughs using beveled edge boards.
 8. Install Barrier Tape where directed by Contracting Officer. Keep a minimum of two rolls on site.
- F. Parking: Provide temporary parking areas for construction personnel.
- G. Dewatering Facilities and Drains: Comply with requirements of the agency(ies) with jurisdiction. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
 2. Remove snow and ice as required to minimize accumulations.
- H. Project Identification and Temporary Signs: Provide Project identification and other signs as required. Fence, barricade, or otherwise block off the immediate work area to prevent unauthorized entry.
1. Provide temporary, directional signs for construction personnel and visitors.
 2. Maintain and touchup signs so they are legible at all times.
 3. Erect and maintain sufficient detour signs at road closures and along detour routes.
- I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of agency(ies) with jurisdiction.

- J. 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.
- K. Existing Stair Usage: Use of existing stairs will be permitted, as long as stairs are cleaned and maintained in a condition acceptable to Contracting Officer. At Substantial Completion, restore stairs to condition existing before initial use.
 - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.
- L. Temporary Use of Permanent Stairs: Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- B. Cleaning of Equipment: Contractor shall ensure prior to moving on to Project Area, equipment, is free of soil, seeds, vegetative matter, or other debris that could contain or hold seeds. Ensure equipment has been pressure washed and is free of exotic species. Equipment shall be considered free of soil, seeds, and other debris when visual inspection does not disclose such material. Disassembly of equipment components or specialized inspection tools are not required.
- C. Temporary Erosion and Sedimentation Control: Refer to Section 01 57 23 "Temporary Storm Water Pollution Prevention".
- D. Tree and Plant Protection: Refer to Section 01 11 00 "Summary of Work".
- E. Pest Control: Follow NPS requirements to minimize attraction and harboring of rodents, roaches, and other pests and perform extermination and control procedures at regular intervals so Project will be free of pests and residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- F. Site Enclosure Fence: Before construction operations begin, furnish and install chain link fencing to prevent people and animals 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. Locate vehicular gates to avoid interference with traffic on public thoroughfares.
 - 3. Locate pedestrian entrance gates as required to provide controlled personnel entry.
 - 4. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Contracting Officer with one set of keys.

- G. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- H. Barricades, Warning Signs, and Lights: Comply with requirements of Manual on Uniform Traffic Control Devices (MUTCD), part IV, 2003 edition for erecting structurally adequate barricades, including warning signs and lighting.
- I. 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 weather tight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. 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 24-hour basis where required to achieve indicated results and 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. NPS reserves right to take possession of Project identification signs.
 - 2. At Substantial Completion, clean and renovate permanent facilities used during construction period.

END OF SECTION 01 50 00

SECTION 01 57 19.11 – INDOOR AIR QUALITY MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Special requirements for Indoor Air Quality (IAQ) management during construction operations.
 - a. Control of emissions during construction.
 - b. Moisture control during construction.
2. Procedures for testing baseline IAQ. Baseline IAQ requirements, specify maximum indoor pollutant concentrations for acceptance of the facility.

1.2 DEFINITIONS

- A. Definitions pertaining to sustainable development: As defined in ASTM E2114.
- B. Adequate ventilation: Ventilation, including air circulation and air changes, required to cure materials, dissipate humidity, and prevent accumulation of particulates, dust, fumes, vapors, or gases.
- C. Hazardous Materials: Any material regulated as a hazardous material in accordance with 49 CFR 173 (Code of Federal Regulations), requires a Material Safety Data Sheet (MSDS) in accordance with 29 CFR 1910.1200, or which during end use, treatment, handling, storage, transportation or disposal meets or has components which meet or have the potential to meet the definition of a Hazardous Waste in accordance with 40 CFR 261. Throughout this specification, hazardous material includes hazardous chemicals.
1. Hazardous materials include pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA) and the International Agency for Research on Cancer (IARC).
- D. Indoor Air Quality (IAQ): Composition and characteristics of air in an enclosed space that affect occupants of that space. Indoor air quality of a space refers to relative quality of air in a building with respect to contaminants and hazards and is determined by the level of indoor air pollution and other characteristics of the air, including impact on thermal comfort such as air temperature, relative humidity and air speed.
- E. Interior final finishes: Materials and products exposed to interior occupied spaces; including flooring, wall covering, finish carpentry, and ceilings.
- F. Packaged dry products: Materials and products installed in dry form delivered in manufacturer's packaging; including carpets, resilient flooring, ceiling tiles, and insulation.

- G. Wet products: Materials and products installed in wet form, including paints, sealants, adhesives, special coatings, and materials which require curing.

1.3 QUALITY ASSURANCE

- A. Inspection and Testing Lab Qualifications: Minimum of 5 years of experience in performing types of testing specified herein.

1.4 SUBMITTALS

- A. Indoor Air Quality (IAQ) Management Plan: After award and before Pre-construction conference, prepare and submit IAQ Management Plan, including:

1. Procedures for control of emissions during construction.
 - a. Identify schedule for application of interior finishes: Identify each interior finish that generates odors, moisture, or vapors or is susceptible to adsorption of odors and vapors. Indicate air handling zone, sequence of application, and curing times.
 - b. Identify potential sources of odor and dust.
 - c. Identify construction activities likely to produce odor or dust.
 - d. Evaluate potential problems by severity and describe methods of control.
 - e. Describe construction ventilation to be provided, including type and duration of ventilation, types of filters and schedule for replacement of filters.
 - f. Describe cleaning and dust control procedures.
 - g. Describe coordination with commissioning procedures.
2. Procedures for moisture control during construction.
 - a. Identify porous materials and absorptive materials.
 - b. Identify schedule for inspection of stored and installed porous and absorptive materials.
3. Revise and resubmit Plan as required by Contracting Officer (CO).
 - a. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.

- B. Product Data:

1. Submit product data for filtration media used during construction and during operation. Include Minimum Efficiency Reporting Value (MERV).
2. Material Safety Data Sheets (MSDS): Submit MSDSs for inclusion in Operation and Maintenance Manual for:
 - a. Adhesives
 - b. Caulking and sealants
 - c. Paint
 - d. Clear finish for wood surfaces
 - e. Lubricants

f. Cleaning products

C. Inspection and Test Reports:

1. Moisture control inspections
2. Moisture content testing
3. Moisture penetration testing
4. Microbial Growth testing

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 IAQ MANAGEMENT - EMISSIONS CONTROL

- A. During construction operations, follow the recommendations in SMACNA IAQ Guidelines for Occupied Buildings under Construction.
- B. Source Control: Provide low and zero VOC materials as specified.
- C. Pathway Interruption: Isolate areas of work to prevent contamination of clean or occupied spaces. Provide pressure differentials and/or physical barriers to protect clean or occupied spaces.
- D. Housekeeping: During construction, maintain project and building products and systems to prevent contamination of building spaces.
- E. Temporary Ventilation: For materials/products that generally require ventilation for off gassing, provide an ACH (air changes per hour) of 1.5 or more and as follows:
 1. Provide minimum 48-hour pre-ventilation of packaged dry products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees Fahrenheit minimum to 90-degree Fahrenheit maximum continuously during ventilation period. Do not ventilate within limits of Work unless otherwise approved by Contracting Officer.
 2. Provide adequate ventilation during and after installation of interior wet products and interior final finishes.
- F. Scheduling: Schedule construction operations involving wet products prior to packaged dry products to the greatest extent possible.

3.2 IAQ MANAGEMENT - MOISTURE CONTROL

- A. Inspections: Document and report results of inspections; state whether or not inspections indicate satisfactory conditions.

1. Examine materials for dampness as they arrive. If acceptable to Contracting Officer, dry damp materials completely prior to installation; otherwise, reject materials that arrive damp.
2. Examine materials for mold as they arrive and reject materials that arrive contaminated with mold.
3. Inspect stored and installed absorptive materials regularly for dampness and mold growth. Inspect after each rain event.
 - a. If stored or installed absorptive materials become wet, notify Contracting Officer. Inspect for damage. If acceptable to the Contracting Officer, dry completely prior to closing in assemblies; otherwise, remove (in accordance with the Waste Management Plan) and replace with new materials.
4. Basement: Monitor basement and crawlspace humidity and dehumidify when relative humidity is greater than 70 percent for more than 2 weeks or at first sign of mold growth.
5. Site drainage: Verify final grades of site work and landscaping drain surface water and ground water away from building.
6. Weatherproofing: Inspect moisture control materials as they are being installed. Include:
 - a. Flashing: Verify correct shingling of flashing for roof, walls, windows, doors, and other penetrations.
 - b. Roofing: In accordance with ASTM D7186 Standard Practice for Quality Assurance Observation of Roof Construction and Repair.

B. Schedule:

1. Schedule work such that absorptive materials, such as porous insulations, paper-faced gypsum board, ceiling tile, and finish flooring, are not installed until they can be protected from rain and construction-related water.
2. Weather-proof as quickly as possible. Schedule installation of moisture-control materials, including but not limited to air barriers, flashing, exterior sealants and roofing, at earliest possible time.

C. Testing for Moisture Content: Test moisture content of porous materials and absorptive materials to ensure they are dry before sealing them into an assembly. Document and report results of testing. Where tests are not satisfactory, dry materials and retest. If satisfactory results cannot be obtained with retest, remove and replace with new materials.

4- Concrete:

- a. ASTM D4263 Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
2. Wood: Moisture test as per ASTM D4444 - Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters; unless otherwise indicated acceptable upper limits for wood products are less than 20% at center of piece; less than 15% at surface.

END OF SECTION 01 57 19.11

SECTION 01 57 19.12 – NOISE AND ACCOUSTICS MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Special requirements for noise and acoustics management during deconstruction & construction operations.

1.2 DEFINITIONS

- A. Ambient noise level: The total noise associated with a given environment, being usually a composite of normal or existing sounds from all sources near and far, excluding the noise source at issue.
- B. Daytime: The hours from 7 A.M. to 8 P.M. on weekdays and 9 A.M. to 8 P.M. on weekends and holidays.
- C. Nighttime: All non-daytime hours.
- D. Property line: The real or imaginary line along the ground surface and its vertical extension, which separates real property owned or controlled by one person from contiguous real property owned or controlled by another person or from any public right-of-way or from any public space.
- E. Receiving noise area: Any real property where people live or work and where noise is heard, excluding the project or source area.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 NOISE MANGEMENT

- A. Noise Control: Perform deconstruction & construction operations to minimize noise. Perform noise-producing work in less sensitive hours of the day or week as directed by the Contracting Officer CO).
- B. Repetitive and/or intermittent, high-level noise: Permitted only during Daytime.

1. Do not exceed the following dB(A) limitations at 50 feet:

<u>Sound Level in dB(A)</u>
70
80

<u>Time Duration of Impact Noise</u>
More than 12 minutes in any hour
More than 3 minutes in any hour

2. Maximum permissible construction equipment noise levels at 50 feet:

<u>EARTHMOVING</u>	<u>dB(A)</u>	<u>MATERIALS HANDLING</u>	<u>dB(A)</u>
Front Loaders	75	Concrete Mixers	75
Backhoes	75	Concrete Pumps	75
Dozers	75	Cranes	75
Tractors	75	Derricks Impact	75
Scrapers	80	Pile Drivers	95
Graders	75	Jack Hammers	75
Trucks	75	Rock Drills	80
Pavers, Stationary	80	Pneumatic Tools	80
Pumps	75	Saws	75
Generators	75	Vibrators	75
Compressors	75		

C. Ambient Noise:

1. Maximum noise levels (dB (decibel)) for receiving noise area at property line shall be as follows:
 - a. In the event the existing local ambient noise level exceeds the maximum allowable receiving noise level (dB), the receiving noise level maximum for construction operations shall be adjusted as follows:
 - b. Residential receiving area: Maximum 3 additional dB above the local ambient as measured at property line.
 - c. Commercial/Industrial receiving area: Maximum 5 additional dB above the local ambient as measured at the property line.

3.2 FIELD QUALITY CONTROL

- A. Assess potential effects of construction noise on facility occupants in accordance with ASTM E1686 and as follows:
 1. Ambient noise measurement: Measure at property line at a height of at least four (4) feet above the immediate surrounding surface. Average the ambient noise level over a period of at least 15 minutes.
 2. Ambient noise measurement at urban sites: Conduct during morning peak traffic hour between 7 A.M. and 9 A.M. and afternoon peak traffic hour between 4 P.M. and 6 P.M. In addition, conduct a 24-hour measurement at the proposed project site to document the noise pattern throughout the day. Adjust and weight for seasonal and climatic variations.
- B. Monitor noise produced from construction operations in accordance with ASTM E1780.

END OF SECTION 01 57 19.12

SECTION 01 57 23 - TEMPORARY STORM WATER POLLUTION PREVENTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Federal Regulations for controlling discharges of pollutants (including chemicals, erodible material, and trash) from municipal separate storm sewer systems, construction sites, and industrial activities, were brought under the National Pollution Discharge Elimination System (NPDES) permit process by amendments to the Clean Water Act (CWA), and promulgation of federal stormwater regulations issued by the United States Environmental Protection Agency (USEPA). The USEPA uses amount of ground disturbance as a measure of a project potential to generate pollution from erosion. NPDES Phase I regulates discharges from construction sites that disturb 5 acres or more. NPDES Phase II regulations expand existing General Permit requirements under Phase I to include/regulate discharges from construction sites that disturb land equal to or greater than one (1) acre and less than 5 acres, known as Small Construction Activity. Construction disturbances 1 acre and above typically require a formal NPDES permit and a formal Stormwater Pollution Prevention Plan (SWPPP) must be submitted to Agency(ies) with Jurisdiction for review and approval.
- B. National Park Service (NPS) Standards and Guidelines require water quality be protected to ensure compliance with Organic Act. Contractor shall prepare an Under-An-Acre Pollution Prevention Plan (UPPP) for each project resulting in less than 1 acre of soil disturbance or not otherwise subject to requirements of NPDES program. ([UPPP Guideline](#))
- C. The work of this section consists of implementing measures to prevent discharges of pollutants, including temporary storm water pollution during construction activities, either through compliance with NPDES permit program, or in conformance with NPS guidance for UPPPs.
- D. Work of this section consists of implementing measures to Temporary Storm Water Pollution during construction activities, either through compliance with NPDES permit program; or in conformance with NPS guidance for UPPPs.

1.2 DEFINITIONS

- A. Definitions pertaining to sustainable development: As defined in ASTM E2114.
- B. Environmental Pollution and Damage: The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances; or degrade utility of the environment for aesthetic, cultural, or historical purposes.
- C. National Pollution Discharge Elimination System (NPDES) Phase I: Regulates discharges from construction sites that disturb 5 acres or more.
- D. NPDES Phase II: Regulations expand existing General Permit requirements under Phase I to include and regulate discharges from construction sites that disturb land equal to or greater than one (1) acre and less than 5 acres, known as Small Construction Activity.

- E. Storm Water Pollution Prevention Plan (SWPPP): Developed and implemented stormwater management measures to protect surface water from pollutants during construction activities disturbing an acre or more in compliance with federal, state, and local requirements for permit approval under NPDES program.
- F. UPPP: Developed and implemented pollution prevention plan (including stormwater management measures, if needed) to protect environment from pollutants on construction projects with less than one acre of disturbance in conformance with NPS guidelines.

1.3 SUBMITTALS

- A. After contract award and before pre-construction conference, prepare and submit:
 - 1. A SWPPP showing SWPPP satisfies Federal and State NPDES permit requirements.
 - 2. A UPPP in conformance with NPS guidelines and adherence to applicable construction storm water management practices.
- B. Inspection Schedule: Submit schedule for inspection and monitoring of pollution prevention measures.
- C. Inspection Schedule: Submit schedule for inspection and monitoring of storm water pollution prevention measures.
- D. Erosion Control Products: Submit manufacturer's product information and installation recommendations for silt fence, filter fabric, erosion control blanket, straw bales, and other materials proposed for use on this project.

1.4 QUALITY ASSURANCE

- A. Contractor shall prepare and submit a plan to Contracting Officer (CO) for review and concurrence.
- B. Orientation Meeting: Contractor shall arrange and conduct an Erosion and Sediment Control meeting/briefing to inform parties, scheduled to be on-site during project, of measures to be implemented for proper erosion and sediment control (may be included as part of Pre-Construction Meeting).
 - 1. Installation of silt fences, storm drain protection, and other forms of erosion and sediment control shall not begin until after this meeting has occurred.
- C. Orientation Meeting: Contractor shall be responsible for arranging and conducting Pollution Prevention meeting/briefing to inform parties scheduled to be on-site during project of measures to be implemented for proper pollution prevention and control (may be included as part of Pre-Construction Meeting).
 - 1. Installation of silt fences, storm drain protection, and other forms of pollution prevention controls shall not begin until after this meeting has occurred.
- D. Pollution Prevention Manager: Contractor shall designate Pollution Prevention Manager who will be responsible for implementation, inspection, maintenance, and amendments to approved plan.

1. Pollution Prevention Manager shall be familiar with UPPP procedures and Best Management Practices (BMPs) and shall ensure emergency procedures and plan are updated as needed and available for inspection.
 2. When changes in approved plan are required, Pollution Prevention Manager shall prepare and certify an amendment and submit to Contracting Officer for review and concurrence.
- E. Pollution Prevention and Erosion Control Manager: Contractor shall designate Pollution Prevention and Erosion Control Manager responsible for implementation, inspection, maintenance, and amendments to approved plan.
1. Pollution Prevention and Erosion Control Manager shall be familiar with temporary storm water pollution prevention procedures and Best Management Practices and ensure emergency procedures and plan are updated as needed and available for inspection.
 2. When changes in approved plan are required, Pollution Prevention and Erosion Control Manager shall prepare and certify an amendment and submit to Contracting Officer for review and concurrence.

PART 2 - PRODUCTS

2.1 TEMPORARY STORM WATER POLLUTION PREVENTION PLAN

- A. Provide SWPPP which satisfies Federal and State NPDES permit requirements and includes:
1. Site description.
 2. Identification and contract information for Pollution Prevention and Erosion Control Manager.
 3. Expected sequencing of operations and construction schedule.
 4. Weather monitoring procedure.
 5. Descriptions and details Best Management Practices for of pollution prevention and erosion controls, including dust control.
 6. Pollution prevention and erosion control plans.
 7. Controls for other potential onsite storm water pollutants.
 8. Applicable specifications.
 9. Maintenance and inspection procedures and forms.
 10. Description of potential non-storm water discharges at site.
 11. Notice of Intent (NOI) form.
 12. Notice of Termination (NOT) form.
 13. Contractor and Sub-contractor Certification forms.
 14. Other record keeping forms and procedures.
 15. Housekeeping Best Management Practices, including vehicle wash-down areas, protection of equipment storage and maintenance areas, and sweeping of roadways related to hauling activities.
- B. Provide UPPP which conforms to NPS requirements (utilize [UPPP template](#)) and include:
1. Responsible Parties
 2. General Information: Project Scope, Project Details, Site Information, and Spill Prevention
 3. Standards and Constraints

4. Project Scheduling
5. Known Data on Soil and Fill
6. Activities with Potential to Generate Sediment
7. Activities and Materials with Potential to Pollute Storm Water
8. Management and Reporting BMPs
9. Waste Management BMPs
10. Non-Storm Water Pollution Control BMPs
11. Soil Stabilization BMPs
12. Sediment Control BMPs
13. Other Pollution Control BMPs
14. References
15. Preparer's Certification
16. Appendices: Contact Information, Pollution Prevention Control Map or Sheet(s), Standard Installation Specifications for each BMP, and Blank forms.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL PROTECTION

- A. Protection of Natural Resources: Comply with applicable regulations and these specifications. Preserve natural resources within project boundaries and outside limits of work performed under this Contract in their existing condition or restore to an equivalent or improved condition as approved by Contracting Officer.
- B. Construction Zone: Arrange construction activities to minimize pollution (i.e., erosion, trash, etc.) to maximum practical extent.
 1. Clearing, excavation, and grading shall be limited to those areas of project site necessary for construction. Minimize area exposed and unprotected.
 2. Clearly mark and delineate limits of work activities.
 3. Equipment shall not be allowed to operate outside limits of work or to disturb existing vegetation.
 4. Excavation and grading shall be completed during dry season to maximum extent possible.
 5. Material shall be stored away from locations where water is present to greatest extent practicable.

3.2 REGULATORY REQUIREMENTS

- A. Permits: Contractor shall obtain required NPDES permits resulting in no impacts to scheduled work. Contractor shall account for possibility of significant lead time in scheduling and executing work.
 1. Implement requirements of NPDES permit for erosion control due to storm water runoff during construction.
 2. Implement good housekeeping practices, inspections and record keeping.
 3. Prior to construction, Contractor and Subcontractors shall sign certifications (included in the plan) that they understand requirements of NPDES permit.

4. Subcontractors shall comply with requirements of NPDES under supervision of Contractor.
 5. Accepted plan shall comply with terms and conditions of EPA permit.
- B. Notice of Intent (NOI): Contractor shall file a Notice of Intent and formal SWPPP as required to the Agency(ies) with Jurisdiction.
- C. Notice of Termination (NOT): After Substantial Completion of Work, file a Notice of Termination (NOT) with the Agency(ies) with Jurisdiction.
- D. Contracting Officer Notification: Contractor shall notify Contracting Officer in writing and by telephone of these events:
1. Erosion and sediment control meeting/briefing.
 2. Following installation of required sediment control structures.
 3. Prior to removal of or modification to sediment control structures.
 4. Prior to removal of sediment control structures.

3.3 TEMPORARY STORM WATER POLLUTION PREVENTION PLAN

- A. Review and Acceptance: Contractor and Contracting Officer will jointly review draft Plan and agree to needed revisions. Contractor shall incorporate revisions, sign, and submit final Plan to Contracting Officer. Final Plan will be the document enforced on the project.
1. Accepted Plan will describe and ensure implementation of practices to be used to reduce pollutants in storm water discharges.
 2. Contractor shall maintain current copy of Plan and associated records and forms at jobsite throughout duration of project.
 3. Plan shall be available for public inspection and inspection and use of Contracting Officer.
 4. Approval of Contractor's Plan will not relieve Contractor of responsibility for compliance with applicable environmental regulations.
- B. Implementation: Implement Plan as required throughout construction period and maintain erosion control elements in proper working order.
1. Do not perform clearing and grubbing or earthwork until Plan has been implemented.
- C. SWPPP (including inspection forms) and data used to complete the NOI shall be provided to Contracting Officer after Substantial Completion of project.

3.4 SITE INSPECTIONS AND PLAN REVISIONS

- A. Inspections: Contractor and Contracting Officer will perform a weekly inspection onsite.
1. Inspection shall include disturbed areas not completely stabilized, areas used for storage of materials, locations where vehicles enter or exit site, and other erosion and sediment controls included in the Plan.
 2. Inspections shall be documented.
 3. Inspection forms shall be retained onsite in Plan notebook throughout construction period.

- B. Plan Revisions: It may be necessary to revise Plan during construction to make necessary improvements, revisions, or to respond to unforeseen conditions noted during construction or site inspections.
 - 1. Plan shall specify mechanism whereby revisions may be proposed by Contractor or Contracting Officer.
 - 2. Contractor and Contracting Officer will jointly review each revision to Plan before changes incorporated and implemented. Contractor will then provide revised copy of Plan to Contracting Officer.
 - 3. Accepted modifications will be implemented within 7 calendar days following date of inspection when deficiencies or necessary corrections are first noted.
- C. Negligence: Provide additional temporary erosion and pollution controls made necessary by Contractor's errors or negligence at no additional cost to Government.

3.5 HOUSEKEEPING AND SITE MANAGEMENT

- A. Store materials onsite in conformance to Federal, state, local, and manufacturer's regulations and specifications. Use Best Management Practices to minimize risk of materials coming into contact with environmental conditions (i.e. water and wind) that could disperse them.
- B. Manage solid waste in conformance to Federal, state, and local regulations. Best Management Practices should be used to minimize risk of materials coming into contact with environmental conditions (i.e. water and wind) that could disperse them.
- C. Include a spill prevention and control plan with provisions placed in SWPPP.
- D. Manage hazardous waste (including contaminated soil) in conformance to Federal, state, local and NPS regulations and guidelines.

3.6 EROSION CONTROL MEASURES

- A. Erosion control measures shall consist of Best Management Practices for storm water discharges, including silt fencing, barrier protectors, straw bales, temporary soil retention blankets, excelsior drainage filters, sediment traps and berms.
- B. Berms and excelsior drainage filters shall be used to form sediment traps and control run-on and run-off into other areas, including creeks, streams, marshes, access roads, well areas, and staging areas.
- C. Erosion control measures shall be used to contain only direct precipitation in construction zone. Contained water shall be allowed to percolate into ground or drain slowly through drainage filter sediment traps.
- D. Earthen sediment traps or holding ponds shall not be used unless accepted by Contracting Officer.
- E. Reduce runoff velocity and direct surface runoff around and away from fuel containment, storage, and borrow areas.
- F. Divert surface runoff around and away from cut and fill slopes.

- G. Place drainage filters around catch basins to create sediment traps to control run-off from construction area.
- H. Excess water used for dust control shall be contained within demolition areas by erosion control measures.
- I. Contractor shall prevent deposition of materials onto paved areas. Contractor shall inspect paved areas for deposited materials weekly and remove materials immediately.
- J. Furnish, install, maintain, and operate necessary control measures and other equipment necessary to prevent erosion as described in approved SWPPP.
- K. Furnish, install, maintain, and operate necessary control measures and other equipment necessary to prevent erosion as described in approved UPPP.
- L. Before work begins, sufficient equipment shall be available on site to assure operation and adequacy of erosion control system can be maintained.

3.7 MAINTENANCE OF TEMPORARY FACILITIES

- A. Ensure erosion and sediment control structures remain effective throughout excavation and grading operations. Relocate structures as necessary.
- B. Inspect control structures after each significant rainfall. Promptly repair breaches which occur.
- C. Contractor shall remove entrapped sediment from behind excelsior drainage filter after each storm.

3.8 REPORTING

- A. If a discharge occurs or if project receives written notice or order from regulatory agency, Contractor shall immediately notify Contracting Officer and shall file written report to Agency(ies) with Jurisdiction within 7 days of discharge event, notice, or order. Corrective measures shall be implemented immediately following discharge, notice, or order. The report to the Agency(ies) with Jurisdiction shall contain:
 - 1. Date, time, location, nature of operation, and type of discharge, including cause or nature of notice or order.
 - 2. Best Management Practices deployed before discharge event, or prior to receiving notice or order.
 - 3. Date of deployment and type of Best Management Practices deployed after discharge event, or after receiving notice or order, including additional Best Management Practices installed or planned to reduce or prevent re-occurrence.
 - 4. An implementation and maintenance schedule for affected Best Management Practices.

3.9 SEDIMENT DISPOSAL

- A. Sediment excavated from temporary sediment control structures shall be disposed on site with general fill, or with topsoil. Sediment shall be allowed to dry out as required before reuse.

- B. Contractor shall place sediment removed from traps and other structures where it will not enter a storm drain or watercourse and where it will not immediately reenter the basin.

3.10 REMOVAL OF TEMPORARY STORM WATER POLLUTION CONTROL MEASURES

- A. Temporary control measures shall be removed with permission of Contracting Officer within 20 working days after final acceptance of project, and/or once grading is complete and slopes have stabilized.

END OF SECTION 01 57 23

SECTION 01 67 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 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 environmental requirements.

1.2 DEFINITIONS

- A. Products: Items purchased for incorporating into Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes "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, current as of date of 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 demonstrated and approved through submittal process, or where indicated as a product substitution, to have 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. Definitions pertaining to sustainable development: As defined in ASTM E2114.
- C. Biobased Materials: As defined in Farm Security and Rural Investment Act, for purposes of Federal procurement of biobased products, "biobased" means a "commercial or industrial product (other than food or feed) composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials." Biobased materials also include fuels, chemicals, building materials, or electric power or heat produced from biomass as defined by The Biomass Research and Development Act of 2000.
 - 1. Biobased content: Amount of biobased carbon in material or product as a percentage of weight (mass) of total organic carbon in material or product.
- D. Chain-of-Custody: Process whereby a product or material is maintained under physical possession or control during its entire life cycle.
- E. Environmentally preferable products: Products and services with lesser or reduced effect on the environment in comparison to conventional products and services. Refer to Environmental Protection Agency's (EPA) Final Guidance on [Environmentally Preferable Purchasing](#) for more information.
- F. Stewardship: Responsible use and management of resources in support of sustainability.

G. Sustainability: Maintenance of ecosystem components and functions for future generations.

1. Recycled Content Materials: Products containing pre-consumer or post-consumer materials as all or part of their feedstock. Recycled content claim shall be consistent with International Organization for Standardization (ISO) 140001 Standard for the Use of Environmental Marketing Claims.
2. Rapidly Renewable Material: Material made from plants typically harvested within a ten-year cycle.
3. Regional Materials: Materials manufactured and extracted, harvested, or recovered within a radius of 500 miles from Project location.

1.3 SUBMITTALS

A. Record Submittals as specified in – Sustainable Design Close-Out Documentation, submit:

1. Affirmative Procurement Reporting Form. Submit on form in Appendix A of this Section, or similar form as approved by Contracting Officer (CO).
2. Submit environmental data in accordance with Table 1 of ASTM E2129 for these products:
 - a. Masonry
 - b. Finish Carpentry
 - c. Plastic Fabrications
 - d. Building Insulation
 - e. Roofing
 - f. Joint Sealers
 - g. Wood & Plastic Doors
 - h. Windows
 - i. Skylights
 - j. Glazed Curtain Wall
 - k. Gypsum Board
 - l. Tile
 - m. Acoustical Ceilings
 - n. Resilient Flooring
 - o. Carpet
 - p. Wall Coverings
 - q. Paints & Coatings
 - r. Toilet Compartments
 - s. Loading Dock Equipment
 - t. Office Equipment
 - u. Furnishings & Accessories
 - v. Renewable Energy Equipment
 - w. Elevators
 - x. Plumbing fixtures and equipment.
 - y. HVAC equipment
 - z. Lighting equipment

.Material Safety Data Sheets (MSDS): For each product required by OSHA to have a MSDS, submit an MSDS. MSDS shall be prepared no earlier than June 1998. Include information for MSDS Sections 1 to 16 in accordance with ANSI Z400.1 and as follows:

- a. Section 1: Chemical Product and Company Identification
 - b. Section 2: Composition/Information on Ingredients
 - c. Section 3: Hazards Identification
 - d. Section 4: First Aid Measures
 - e. Section 5: Fire Fighting Measures
 - f. Section 6: Accidental Release Measures
 - g. Section 7: Handling and Storage
 - h. Section 8: Exposure Controls/Person Protection
 - i. Section 9: Physical and Chemical Properties
 - j. Section 10: Stability and Reactivity Data
 - k. Section 11: Toxicological Information. Include data used to determine the hazards cited in Section 3. Identify acute data, carcinogenicity, reproductive effects, and target organ effects.
 - l. Section 12: Ecological Information. Include data regarding environmental impacts during raw materials acquisition, manufacture, and use. Include data regarding environmental impacts in event of accidental release.
 - m. Section 13: Disposal Considerations. Include data regarding proper disposal of the chemical. Include information regarding recycling and reuse. Indicate whether or not product is considered to be "hazardous waste" according to United States EPA Hazardous Waste Regulations 40 CFR 261 (Code of Federal Regulations).
 - n. Section 14: Transportation Information. Identify hazard class for shipping.
 - o. Section 15: Regulatory Information. Identify federal, state, and local regulations applicable to the material.
 - p. Section 16: Other Information. Include additional information relative to recycled content, biobased content, and other information regarding environmental and health impacts. Identify the date MSDS was prepared.
4. Chain of Custody: Submit chain-of-custody documentation for sustainable forestry for these products:
- a. Rough Carpentry
 - b. Finish Carpentry
 - c. Wood Doors
 - d. Windows
 - e. Wood Flooring
 - f. Furnishings & Accessories

1.4 QUALITY ASSURANCE

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

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

1. Schedule delivery to minimize long-term storage at Project site and 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 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 ensure compliance with Contract Documents. Ensure products are undamaged and properly protected.
5. Obtain materials in biodegradable or recyclable/reusable packaging which uses minimum amount of packaging possible.

C. Storage:

1. Allow for inspection and measurement of quantity or counting of units.
2. Store materials in manner to not endanger Project structure.
3. Store products subject to damage by the elements, under cover in weather tight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Store loose granular materials in well-drained area on solid surfaces to prevent mixing with foreign matter.

1.6 PACKAGING

- A. Where Contractor has option to provide one of listed products or equal, preference shall be given to products with minimal packaging and easily recyclable packaging as defined in ASTM D5834.
- B. Maximize use of source reduction and recycling procedures outlined in ASTM D5834.
- C. Provide minimum 45 percent post-consumer recycled content and minimum 100 percent recovered fiber content of industrial paperboard in accordance with EPA's Comprehensive Procurement Guidelines and ASTM D5663.
- D. Provide minimum 10 percent post-consumer recycled content and minimum 10 percent recovered fiber content of carrier board in accordance with EPA's Comprehensive Procurement Guidelines and ASTM D5663.
- E. Provide minimum 5 percent post-consumer recycled content and minimum 5 percent recovered fiber content of brown papers (e.g., wrapping papers and bags) in accordance with EPA's Comprehensive Procurement Guidelines and ASTM D5663.

1.7 ENVIRONMENTALLY PREFERABLE PRODUCTS

- A. Provide environmentally preferable products to greatest extent possible.
 - 1. To greatest extent possible, provide products and materials with a lesser or reduced effect on the environment considering raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, and/or disposal of the product.
 - 2. Eliminate use of ozone depleting compounds during and after construction where alternative environmentally preferable products are available, consistent with either Montreal Protocol and Title VI or Clean Air Act Amendments of 1990, or equivalent overall air quality benefits that take into account life cycle impacts.
 - 3. Use products meeting or exceeding EPA's recycled content recommendations for EPA-designated products. Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% (based on cost) of total value of the materials in project.

1.8 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of Contract Documents.
 - 1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for product specifically endorsed by manufacturer to Owner.
 - 2. Special Warranty: Written warranty required by or incorporated into Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.
- B. Special Warranties: Prepare written document containing appropriate terms and identification, ready for execution. Submit draft for approval before final execution.
 - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 - 2. Specified Form: When specified forms are included with Specifications, prepare written document using appropriate form properly executed.
 - 3. Refer to Divisions 2 through 49 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 77 00 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products to comply with Contract Documents, undamaged and, unless otherwise indicated, 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 produced and used successfully in similar situations on other projects.
3. Government reserves right to limit selection to products with warranties not in conflict with requirements of Contract Documents.
4. Where products are accompanied by term "as selected," Contracting Officer will make selection.
5. Where products are accompanied by term "match sample," sample to be matched is Governments.
6. Descriptive, performance, and reference standard requirements in Specifications establish "salient characteristics" of products.

B. Product Selection Procedures:

1. Product: Where Specifications name single product and manufacturer, provide named product that complies with requirements or approved equal.
2. Manufacturer/Source: Where Specifications name single manufacturer or source, provide product by named manufacturer or source that complies with requirements or approved equal.
3. Products: Where Specifications include list of names of both products and manufacturers, provide one of the products listed that complies with requirements or approved equal.
4. Manufacturers: Where Specifications include list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements or approved equal.
5. Available Products: Where Specifications include list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
6. Available Manufacturers: Where Specifications include list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
7. Product Options: Where Specifications indicate sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide specified product, system, or approved equal.
8. Basis-of-Design Product: Where Specifications name product and include a list of manufacturers, provide specified product or a comparable product by one of the other named manufacturers, or approved equal. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics based on the product named.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select product that complies with requirements and matches Architect's sample. Contracting Officers decision will be final on whether a proposed product matches.
 - a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.

10. Visual Selection Specification: Where Specifications include phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
 - a. Standard Range: Where Specifications include phrase "standard range of colors, patterns, textures" or similar phrase, Contracting Officer will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
 - b. Full Range: Where Specifications include phrase "full range of colors, patterns, textures" or similar phrase, Contracting Officer will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

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

PART 3 - EXECUTION

3.1 PROTECTION AFTER INSTALLATION

- A. Provide adequate coverings as necessary to protect installed materials from damage resulting from natural elements, traffic, and subsequent construction. Remove when no longer needed.

END OF SECTION 01 67 00

AFFIRMATIVE PROCUREMENT REPORTING FORM
Recycled Content Materials & Biobased Content Materials

Project Name: _____ Project Number: _____
 Contractor Name: _____ License Number: _____
 Contractor Address: _____

Product	Total \$ value provided	Total \$ value with recycled content Pre- consumer	Total \$ value with recycled content Post- consumer	Total \$ value with biobased content	Exempted indicate 1,2,3,4	Comments
Hydraulic Mulch (paper based)						
Hydraulic Mulch (wood based)						
Compost						
Parking Stops (Concrete w/ fly ash, slag cement or low cement content)						
Parking Stops (Plastic/Rubber)						
Patio Blocks/Rubber						
Patio Blocks/Plastic						
Playground Surfaces						
Concrete with fly ash						
Concrete with slag cement						
Concrete with low cement content						
Plastic lumber						
Building Insulation						
Rock Wool						
Fiber glass						
Cellulose						
Perlite Comp Board						
Plastic Rigid Foam						
Glass Fiber Reinforced Foam						
Phenolic Rigid Foam						
Ceramic tile						
Resilient flooring						
Floor Tiles/Rubber						
Floor Tiles/Plastic						
Running Tracks						
Carpet (PET)						
Paint						

Reprocessed Latex Paint White & Light Colors						
Reprocessed Latex Dark Colors						
Consolidated Latex Paint						
Toilet/Shower partitions (plastic or steel)						
Other						

CERTIFICATION

I hereby certify the information provided herein is accurate and that the requisition/procurement of all materials listed on this form comply with current EPA standards for recycled/recovered materials content.

The following exemptions may apply to the non-procurement of recycled/recovered content materials:

1. The product does not meet appropriate performance standards.
2. The product is not available within a reasonable time frame.
3. The product is not available competitively (from two or more sources).
4. The product is only available at an unreasonable price (compared with a comparable non-recycled content product.)

Signature: _____ Date: _____

END OF
AFFIRMATIVE PROCUREMENT REPORTING FORM
Recycled Content Materials & Biobased Content Materials

SECTION 01 73 29 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes procedural requirements for cutting and patching on buildings that do not contain Historic Fabric.

1.2 SUBMITTALS

- A. Cutting and Patching Plan: Submit Plan describing procedures at least 10 days before cutting and patching will be performed, requesting approval to proceed. Include:
 - 1. Extent: Describe cutting and patching, show how performed, and indicate why they cannot be avoided.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform Work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
 - 6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure. Do not cut and patch structural elements in a manner that could change their load carrying capacity or increase deflection.
 - 7. Contracting Officer's (CO) Approval: Obtain approval of cutting and patching plan before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.3 QUALITY ASSURANCE

- A. Leadership in Energy and Environmental Design (LEED™) Requirements for Building Reuse:
 - 1. Credit MR 1.1 (Materials and Resources): Maintain existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing, excluding window assemblies and nonstructural roofing material) not indicated to be removed; do not cut such existing construction beyond indicated limits.
 - 2. Credit MR 1.3 (Materials and Resources): Maintain existing interior nonstructural elements (interior walls, doors, floor coverings, and ceiling systems) not indicated to be removed; do not cut such existing construction beyond indicated limits.

3. Credit MR 1.2 (Materials and Resources): Maintain existing nonshell, nonstructural components (walls, flooring, and ceilings) not indicated to be removed; do not cut such existing construction beyond indicated limits.
- B. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
1. Multi-width masonry walls will require approval for cutting and patching
 2. Cast iron at the upper levels will require approval for removing, cutting, or patching
- C. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on exterior or in occupied spaces in a manner that would, in Contracting Officer's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.4 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with requirements in Section 01 81 13.13 "Sustainable Design Requirements - LEED™ for New Construction and Major Renovations," Section 01 81 13.16 "Sustainable Design Requirements - LEED™ for Commercial Interiors," Section 01 81 13.19 "Sustainable Design Requirements - LEED™ for Core and Shell Development," and Section 01 81 13.23 "Sustainable Design Requirements - LEED™ for Schools."
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that will match the visual and functional performance of in-place materials when installed.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at earliest feasible time. Complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction subsequently. Patch as required to restore surfaces to original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer and original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from exposed or finished side into concealed surfaces.
 - 3. Concrete & Masonry: Cut using an abrasive saw or a diamond-core drill.
 - 4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.

5. Proceed with patching after construction operations cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another. Patch and repair floor and wall surfaces in new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 4. Ceilings: Patch, repair, or re-hang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01 73 29

SECTION 01 73 40 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general procedural requirements governing execution of Work including:

1. Coordination with utility service providers
2. Construction layout
3. Field engineering and surveying
4. General installation of products
5. Progress cleaning
6. Starting and adjusting
7. Protection of installed construction
8. Correction of the Work

1.2 SUBMITTALS

- A. Landfill Receipts: Submit copy of receipts issued by landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: Existence and location of site improvements and other construction indicated as existing are not guaranteed.
1. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 2. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: Existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify existence and location of underground utilities and other construction affecting Work.
1. Before construction, verify location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 COORDINATION WITH UTILITY SERVICE PROVIDERS

- A. Coordination with Utility Service Providers: Contact following Utility Service providers, sufficiently in advance to avoid delaying the work, to coordinate Contractor's portion of Work, testing requirements, inspections, etc.
 - 1. Water Service Contact: Contact Cape Lookout National Seashore (CALO to identify point of contact) to coordinate Water service requirements.
 - a. Construction Contractor Responsibilities: Contractor is responsible for the maintenance and upkeep of their water service based upon restrictions noted in the Temporary Facilities and Controls specification.

3.3 PREPARATION

- A. Field Measurements: Take field measurements as required to fit Work properly. Recheck measurements before installing each product. Where portions of Work are indicated fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of need for clarification of the Contract Documents caused by differing field conditions outside control of Contractor, submit request for information to Contracting Officer in accordance with Section 01 31 00 "Project Management and Coordination."

3.4 CONSTRUCTION LAYOUT

- A. Verification: Verify layout information shown on Drawings, in relation to the existing benchmarks before proceeding to lay out Work. Notify Contracting Officer promptly if discrepancies are discovered.

- B. Record Log: Maintain log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make log available for review by National Park Service (NPS).

3.5 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning Work. Preserve and protect permanent benchmarks and control points during construction operations. Controls destroyed by Contractor will be replaced by Contractor at their expense.
 - 1. Existing Monuments: All benchmarks, land corners, and triangulation points, established by other surveys, existing within construction area shall be preserved. If existing monuments interfere with Work, secure written permission before removing them.

3.6 INSTALLATION

- A. General: Locate Work and components of Work accurately in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions for best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of Work.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Contracting Officer.
 - 2. Allow for building movement, thermal expansion, and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with

integral anchors to be embedded in concrete or masonry. Deliver to Project site in time for installation.

- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials not considered hazardous.

3.7 PROGRESS CLEANING

- A. General: Clean Project site, work areas, and common areas daily. Coordinate progress cleaning for joint-use areas where more than one Installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in National Fire Protection Association (NFPA) 241 for removal of combustible waste materials and debris at the end of every work session.
 - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 degrees Fahrenheit (27 degrees Celsius).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to level of cleanliness necessary for proper execution of Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of Work, broom-clean or vacuum entire work area, as appropriate.
 - 3. Contractor shall provide progress cleaning that minimizes sources of food, water, and harborage available to pests.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials not hazardous to health or property and will not damage exposed surfaces.
 - 1. Utilize non-toxic cleaning materials and methods.
 - a. Comply with Green Seal Standard (GS) 37 for general purpose cleaning and bathroom cleaning.
 - b. Use natural cleaning materials where feasible. Natural cleaning materials include:
 - 1) Abrasive cleaners: substitute 1/2 lemon dipped in borax.
 - 2) Ammonia: substitute vinegar, salt and water mixture, or baking soda and water.
 - 3) Disinfectants: substitute 1/2 cup borax in gallon water.
 - 4) Drain cleaners: substitute 1/4 cup baking soda and 1/4 cup vinegar in boiling water.
 - 5) Upholstery cleaners: substitute dry cornstarch.

- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.
- H. Clean and protect construction in progress and adjoining materials already in place during handling and installation. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations so that no part of construction completed or in progress, is subject to harmful, dangerous, damaging, or deleterious exposure during construction period.
- K. Final Cleaning: At completion of Work, remove remaining waste materials, rubbish, tools, equipment, machinery and surplus materials. Clean exposed surfaces and leave Project clean and ready for occupancy.
 - 1. Provide final cleaning in accordance with ASTM E1971.

3.8 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Section 01 40 00 "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Section 01 73 29 "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to specified condition.
- C. Remove and replace damaged surfaces exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 40

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.

1.2 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Solid Waste: Garbage, debris, sludge, or other discharged material (except hazardous waste) including solid, liquid, semisolid, or contained gaseous materials resulting from domestic, industrial, commercial, mining, or agricultural operations.
- D. Debris: Non-hazardous solid waste generated during construction, demolition, or renovation of a structure which exceeds 2.5 inch (60 millimeter) particle size that is: a manufactured object; plant or animal matter; or natural geologic material (e.g. cobbles and boulders). A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if mixture is comprised primarily of debris by volume, based on visual inspection.
- E. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- F. Environmental Pollution and Damage: Presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances; or degrade utility of environment for aesthetic, cultural, or historical purposes.
- G. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.
- H. Hazardous Materials: Material regulated as a hazardous material in accordance with 49 CFR 173 (Code of Federal Regulations), requires a Material Safety Data Sheet (MSDS) in accordance with 29 CFR 1910.1200, or which during end use, treatment, handling, storage, transportation or disposal meets or has components which meet or have potential to meet the definition of Hazardous Waste in accordance with 40 CFR 261.

- I. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- J. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- K. Single-use plastic products: Plastic items intended to be disposed of immediately after use, including plastic and polystyrene food and beverage containers, bottles, straws, cups, cutlery, and disposable plastic bags.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Project shall minimize creation of construction, deconstruction, and demolition waste to protect and restore natural habitat and resources. Minimize factors contributing to waste such as over packaging, improper storage, ordering error, poor planning, breakage, mishandling, single-use plastic products, and contamination. A Waste Management Plan shall be developed to ensure that existing site and building materials are reused, salvaged, or recycled. Minimize waste disposal in landfills.
- B. Salvage /Recycle Requirements: Develop waste management plan resulting in end-of-Project rates for salvage/recycling of 50 percent by weight of total waste generated by the Work. The following waste categories, at a minimum, shall be diverted from a landfill:
 - 1. Land clearing debris (chipped debris can be used on site for mulch or erosion control)
 - 2. Clean dimensional wood, palettes
 - 3. Plywood, OSB (oriented strand board), and particle board
 - 4. Concrete (can be ground and used for fill on site)
 - 5. Asphaltic concrete (can be ground and used for fill on site)
 - 6. Cardboard, paper, packaging, newsprint
 - 7. Metals (from banding, stud trim, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze)
 - 8. Gypsum drywall - unpainted
 - 9. Non-hazardous paint and paint cans
 - 10. Beverage containers: Aluminum, glass, and plastic containers
 - 11. Insulation
 - 12. Ceiling grid and tiles
 - 13. Ductwork
 - 14. Wiring
 - 15. Other mixed construction and demolition waste as appropriate.
- C. If waste materials encountered during deconstruction/demolition or construction phase are found to contain lead, asbestos, polychlorinated biphenyls (PCBs), (such as fluorescent lamp ballasts), or other harmful substances, they are to be handled and removed in accordance with local, state, and federal laws and requirements concerning hazardous waste.
- D. Existing items and material to be removed during deconstruction/demolition phase shall be reused in construction phase of the Project. Items that cannot be reused shall be recycled. Items considered for reuse must be in refurbishable condition and must meet quality standards set forth in these specifications. Contractor shall ensure quality of the item(s) in question will meet or exceed accepted industry or trade standards for first quality commercial grade application. During

construction, deconstruction, or demolition Contracting Officer (CO) may designate other objects or materials for reuse.

- E. Salvage/Recycle Requirements: Government goal is to salvage and recycle as much nonhazardous demolition and construction waste as possible including the following materials:
 - 1. Brick Masonry
 - 2. Cast Iron

1.4 SUBMITTALS

- A. Waste Management Plan: After award of contract and prior to scheduled Pre-Construction Conference, Contractor shall submit a draft Waste Management Plan to Contracting Officer for approval. Submit 3 copies of plan. Revise and resubmit Plan as required by Contracting Officer. Approval of Contractor's Plan will not relieve Contractor of responsibility for compliance with applicable environmental regulations.
- B. Progress Documentation: Supplemental to Waste Management Plan, document solid waste disposal, diversion, and cost/revenue analysis and submit completed worksheet on a monthly basis. See Project Waste Management Plan Worksheet Sample, attached to the end of the Division 1 Specifications, and report totals to date for column headings.
- C. Waste Reduction Calculations: Before request for Substantial Completion, submit three copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- F. 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.
- G. 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.
- H. LEED™ Submittal: LEED™ letter template for Credit MR 2.1 (Materials and Resources), signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
- I. Qualification Data: For Waste Management Coordinator.
- J. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating refrigerant that was present was recovered and recovery was performed according to Environmental Protection Agency (EPA) regulations. Include name and address of technician and date refrigerant was recovered.

K. Progress payment requirements:

1. With each Application for payment, submit an updated Project Waste Management Plan worksheet for solid waste disposal and diversion.
2. With each Application for Payment, submit manifests, weight tickets, receipts, and invoices specifically identifying the Project and waste material.

L. Closeout Submittals

1. With Closeout Submittals, submit a summary of a Project Waste Management Plan worksheet for solid waste disposal and diversion.

1.5 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, with record of successful waste management coordination of projects with similar requirements, that employs a LEED™-Accredited Professional, certified by USGBC, as waste management coordinator.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Waste Management Meeting: Conduct separate meeting or cover in Pre-Construction Conference and comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to waste management including:
1. Review and discuss waste management plan including responsibilities of 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 procedures for reduction of single-use plastic products on site.
 6. Review waste management requirements for each trade.

PART 2 - PRODUCTS

2.1 WASTE MANAGEMENT PLAN

- A. General: Develop plan consisting of waste identification and waste reduction work plan. Include separate sections in plan for 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. Include estimated quantities and assumptions for estimates.

- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
1. Salvaged Materials for Reuse: For materials salvaged and reused in Project, describe methods for preparing salvaged materials before incorporation into the Work.
 2. Salvaged Materials for Sale: For materials sold to individuals and organizations, include list of names, addresses, and telephone numbers.
 3. Salvaged Materials for Donation: For materials donated to individuals and organizations, include list of names, addresses, and telephone numbers.
 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 6. Handling and Transportation Procedures: Include method used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.
 7. Reduction of single-use plastic products: Include methods for water distribution to include bottle refilling stations if available for personnel.
- D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include:
1. Landfill tip fees per ton.
 2. If diverted, tip fee savings from landfill diversion.
 3. Costs of recycling, salvage, or reuse.
 4. Revenue from recycling, salvage, or reuse.
 5. Total cost or savings from diversion. (Calculate by using tip fee savings and subtracting costs of recycling or adding revenue from recycling.)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement waste management plan as approved by Contracting Officer. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during entire duration of Contract.
- B. Waste Management Coordinator: Engage waste management coordinator responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.
- C. Contractor shall establish contacts with local recycling and reuse companies to set up lines of responsibility. Contractor shall be responsible for coordination in terms of identifying materials, pickup schedules, and standard quality for recycled materials.
- D. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
 2. Distribute waste management plan to entities when they begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- E. 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.
- F. Separation facilities:
1. Contractor shall designate and Contracting Officer shall approve specific area or areas to facilitate separation of materials for potential reuse, salvage, recycling, and return.
 2. Place waste and recycling bins near each other, and close to point of waste generation but out of traffic pattern.
 3. Keep recycling and waste bin areas neat, clean, and clearly marked in order to avoid comingling of materials.
 4. Protect bins during non-working hours from off-site contamination.
 5. Check garbage dumpsters periodically for recyclables being thrown away and undocumented materials that could be recycled.
- G. Materials handling procedures: Material to be recycled shall be protected from contamination and shall be handled, stored, and transported in a manner that meets requirements set by designated facilities for acceptance. Establish defined area for operations of each trade, especially woodcutting so off-cuts are kept in one area and can be sorted by dimension for future reuse.

3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in secure area until installation.
 4. Protect items from damage during transport and storage.
 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for Sale and Donation: Not permitted on Project site.
- C. Salvaged Items for Governments Use:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Allow for inspection if necessary.
 4. Store items in secure area until delivery to Government.
 5. Transport items to storage area designated by Government.
 6. Protect items from damage during transport and storage.

3.3 RECYCLING DEMOLITION WASTE

- A. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
- B. 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.
- C. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- D. Lighting Fixtures: Separate lamps by type and protect from breakage.
- E. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.
- F. Conduit: Reduce conduit to straight lengths and store by type and size.
- G. Electronic Products: Ensure non-usable electronic products are reused, donated, sold, or recycled using environmentally sound management practices at end of life.

3.4 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in 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 not containing painted or treated wood.

3.5 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose in landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials to accumulate on-site.
 - 2. Remove and transport debris in manner preventing spillage on adjacent surfaces and areas.

- B. Burning: Do not burn waste materials.
- C. Burning: Burning of waste materials allowed only at designated areas on Government property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.
- D. Disposal: Transport waste materials off Government property and legally dispose of them.

END OF SECTION 01 74 19

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including:
 - 1. Project Record Drawings
 - 2. Closeout Submittals
 - 3. Substantial Completion and Final Inspection
 - 4. Permit Closure and Transfer
 - 5. Final Acceptance of the Work
 - 6. Warranties

1.2 PROJECT RECORD DRAWINGS

- A. Maintain one complete full-size set of contract drawings and one full-size set of vendor-supplied drawings. Clearly mark changes, deletions, and additions using National Park Service (NPS) drafting standards to show actual construction conditions. Show additions in red, deletions in green and special instructions in blue.
- B. Keep record drawings current. Make record drawings available to Contracting Officer (CO) for inspection at the time of monthly progress payment requests. If project record drawings are not current, Contracting Officer may retain an appropriate amount of progress payment.
- C. Submit complete record drawings on completion of total project. Include shop drawings, sketches, and additional drawings to be included in final set, with clear instructions showing the location of these drawings.

1.3 CLOSEOUT SUBMITTALS

- A. A list of closeout requirements has been attached at the end of the Division 1 Specifications for your convenience. The intent is to provide an overall summary of requirements and not a comprehensive list. Terms and conditions of the contract require satisfaction of requirements of individual specification sections regardless of what is shown on the list. Submit the following before requesting final inspection:
 - 1. Specific warranties, guarantees, workmanship bonds, final certifications, and similar documents.
 - 2. NPS required forms for occupancy, Fire Sprinkler/Alarm acceptance, and other similar forms or certificates.
 - 3. Project Record Documents, operation and maintenance manuals, final completion construction digital images recorded on CD-R (compact disc-recordable) or DVD-R (digital video disc-recordable) with index and descriptions, and similar final record information.
 - 4. Environmental Record Documents: As specified as follows:

- a. IAQ Management Plan: As specified in Section 01 57 19.11 Indoor Air Quality (IAQ) Management.
 - b. Product Data for filtration media: As specified in Section 01 57 19.11 Indoor Air Quality (IAQ) Management.
 - c. Moisture Control inspections and reports: As specified in Section 01 57 19.11 Indoor Air Quality (IAQ) Management.
 - ~~d.~~ Material Safety Data Sheet (MSDS) Data: As specified in Section 01 57 19.11 Indoor Air Quality (IAQ) Management
 - e. Final Summary of Solid Waste Disposal and Diversion: As specified in Section 01 74 19 Construction Waste Management.
- 5. Posted Operating Instructions: As specified in individual sections. Furnish operating instructions attached to or posted adjacent to equipment. Include wiring diagrams, control diagrams, control sequence, start-up, adjustment, operation, lubrication, shut-down, safety precautions, procedures in the event of equipment failure, and other items of instruction recommended by manufacturer.
 - 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Contracting Officer. Label with manufacturer's name and model number where applicable.
 - a. Special Tools: One set of special tools required to operate, adjust, dismantle, or repair equipment. Special tools are those not normally found in possession of mechanics or maintenance personnel.
 - 7. Keys and Keying Schedule: Submit keys including duplicates. Wire keys for each lock securely together. Tag and plainly mark with lock number, equipment identification, or panel or switch number, and indicate location, building, and room name or number.
 - 8. Make final changeover of permanent locks and deliver keys to Contracting Officer. Advise Park personnel of changeover in security provisions.
 - 9. Test and balance report.
 - 10. Terminate and remove temporary facilities, mockups, construction tools, and similar elements from Project site, complete final cleaning requirements, including touchup painting.
 - 11. Touch up and repair and restore marred exposed finishes to eliminate visual defects.
 - 12. Instruct NPS personnel in operation, adjustment, and maintenance of products, equipment, and systems.

1.4 FINAL INSPECTION, SUBSTANTIAL COMPLETION AND ACCEPTANCE PROCEDURES

- A. Request final inspection in writing when project or the designated portion of project is substantially complete. Contracting Officer will proceed with inspection within 10 days of receipt of written request or will advise Contractor of items that prevent project from being substantially complete.
 - 1. Final inspection will be complete once the base bid plus and selected bid options are complete.
- B. If work is determined substantially complete, following final inspection, Contracting Officer will prepare Punch List and issue a Letter of Substantial Completion.

- C. If work is not determined substantially complete following final inspection, Contracting Officer will notify Contractor in writing. Contractor shall request new final inspection after completing work. Re-inspection costs may be charged against Contractor in accordance with Inspection of Construction contract clause.
- D. Contractor shall complete Punch List within 30 calendar days, documented weather permitting.
 - 1. Prior to requesting final inspection:
- E. If Contractor completes items of work on Punch List and contractually required items, Contracting Officer will issue Letter of final acceptance of work.
- F. If Contractor fails to complete work within the time frame, Contracting Officer may correct work with an appropriate reduction in contract price or charge for re-inspection costs in accordance with Inspection of Construction contract clause.

1.5 PERMIT CLOSURE AND TRANSFER

- A. When work covered by the permits is complete, create list of tasks required to close or transfer permits to Park. Submit to Contracting Officer for approval.
- B. After substantial completion and Punch List completion, permits shall be closed and documented by Agency(ies) with Jurisdiction for the permit.
- C. If responsibility for permits is to be transferred to Park, Park shall be informed of permit provisions completed and responsibilities transferring to Park staff.

1.6 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Contracting Officer for designated portions of Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Organize warranty documents into an orderly sequence based on table of contents of Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2 by 11 inch (215 by 280 millimeters) paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify product or installation. Provide typed description of product or installation, including name of product and name, address, and telephone number of Installer.
 - 3. Identify each binder on front and spine with typed or printed title "WARRANTIES," Project name, and name of Contractor.
 - 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF (portable document format) file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- C. Provide additional copies of each warranty in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. See Division 1 Specification Section "Execution" for information on cleaning agents.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Conduct final 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 following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to 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 dirt-free condition, free of stains, films, and foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to 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; shampoo, soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and vision-obscuring materials. Replace chipped or broken glass and transparent materials. Polish mirrors and glass.
 - k. Remove labels that are not permanent.
 - l. Touch up, repair, and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" (Underwriters Laboratories) and similar labels, including mechanical and electrical nameplates.

- m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Replace parts subject to unusual operating conditions.
 - o. Clean plumbing fixtures to sanitary condition, free of stains, including stains resulting from water exposure.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out and noticeably dimmed bulbs, and defective or noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - r. Leave Project clean and ready for occupancy.
- C. Pest Control: Engage experienced, licensed exterminator to make a final inspection and rid project of rodents, insects, and other pests. Provide Government with report.
- D. Waste Disposal: Comply with requirements of Section 01 74 19 "Construction Waste Management and Disposal."

END OF SECTION 01 77 00

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including:
 - 1. Manuals, general
 - 2. Emergency manuals
 - 3. Operation manuals for systems, subsystems, and equipment
 - 4. Maintenance manuals for care and maintenance of products, materials, and finishes, systems and equipment
- B. See Divisions 2 through 49 Sections for additional operation and maintenance manual requirements for Work in those Sections.

1.2 SUBMITTALS

- A. Manual: Submit two copies of each manual in draft form or one electronic copy at least 15 days before final inspection. Contracting Officer (CO) will return copy or edit version with comments within 15 days of receipt.
- B. Format: Submit operations and maintenance manuals in following format:
 - 1. PDF (portable document format) electronic file. Assemble each manual into composite electronically indexed file. Submit on digital media acceptable to Contracting Officer.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
 - 2. Hard copy manual: In accordance with Part 2 of this Section.
 - 3. Correct or modify each manual to comply with Contracting Officers comments. Submit 4 copies of each corrected manual within 15 days of receipt of Contracting Officers comments.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize manual into separate sections for each system and subsystem, and separate sections for each piece of equipment not part of a system. Manual shall contain title page, table of contents, and manual contents.
 - 1. Provide Manual in binder form (noted below) as well as uploaded to two USB drives to be delivered to Park. USB drives shall be broken out in the same manner as physical binder.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include:
 - 1. Project Title
 - 2. Location
 - 3. Park
 - 4. Contract Number
 - 5. Prime Contractors Name and Address
 - 6. Date of Substantial Completion
 - 7. Binder Volume Number
- C. Table of Contents: List each product included in manual, identified by product name, indexed to content of the volume, and cross-referenced to Specification Section number in Project Manual.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. Assemble instructions for subsystems, equipment, and components of one system into a single binder if needed.
 - 1. Binders: White, commercial quality, hard back, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2 by 11 inch (215 by 280 millimeter) paper; with clear plastic window sleeve on front and spine to hold label describing contents and pockets inside covers to hold folded oversize sheets.
 - a. Cover Sheet: Identify binders on front and spine, with project title, location, park, contract number, prime contractor's name and address, date of substantial completion, and binder volume number. Insert cover sheet into clear plastic view pocket on front of binder. Insert sheet into clear plastic view pocket on spine with title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 - 2. Data: Fill binders to no more than 75 percent of capacity. Punch holes shall not obscure any data. When contents of a single tabbed section cover more than one item, provide colored paper sheets to separate the data for each item.
 - a. Manufacturers' Data: Provide originals for color or copyrighted data. Black and white data may be originals or clean, good quality reproductions. No copies produced by facsimile transmission and sheets with stamps, such as submittal approval stamps. Include only sheets that apply to items installed; cross out inapplicable data.
 - b. Vendor Furnished As-Built Drawings: Maximum 24 inch by 36 inch sheets with minimum character or lettering size of 1/8 inch. Reduced-size reproductions may be

provided instead of full-size drawings if reproductions are clear and legible. If reduced-size drawings are used, identify as "REDUCED SIZE" and provide graphic scales, if applicable.

- c. Custom Data: Data supplemented by drawings and schematics necessary to describe systems adequately.
 - d. Equipment Data Sheet: Data, using form at end of this section.
 - e. Schedules: Schedules reflecting final, as-installed conditions.
 - f. Poorly reproduced or illegible data will be rejected.
- 3. Dividers: Divider sheets with Mylar reinforced edges and pre-printed numbered tabs aligned with numbers and title lines on index sheet. Include typed list of products and major components of equipment included in section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 - 4. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
 - 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.

2.2 EMERGENCY MANUALS

- A. Content: Organize manual into separate section for type of emergency, emergency instructions, and emergency procedures.
- B. 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 for fire & flood.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of National Park Service (NPS) operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include instructions on stopping, shutdown instructions for each type of emergency, operating instructions for conditions outside normal operating limits, and required sequences for electric or electronic systems.

2.3 OPERATION AND MAINTENANCE MANUALS

- A. Operation Requirements
 - 1. Content: In addition to requirements in Section, include operation data required in individual Specification Sections and equipment descriptions, operating standards, operating procedures, operating logs, wiring and control diagrams, and license requirements.

2. Descriptions: Include:
 - a. Product name and model number
 - b. Manufacturer's name
 - c. Equipment identification with serial number of each component
 - d. Equipment function
 - e. Operating characteristics
 - f. Limiting conditions
 - g. Performance curves
 - h. Engineering data and tests
 - i. Complete nomenclature and number of replacement parts
3. Operating Procedures: Include start-up, break-in, and control procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; and required sequences for electric or electronic systems.
4. Systems and Equipment Controls: Describe sequence of operation, and diagram controls as installed.
5. Piped Systems: Diagram piping as installed and identify color-coding where required for identification.

B. Maintenance Requirements for Systems and Equipment

1. 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 warranty and bond information, and equipment data sheets as described below.
2. 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.
3. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including maintenance instructions, drawings and diagrams for maintenance, nomenclature of parts and components, and recommended spare parts for each component part or piece of equipment:
4. Maintenance Procedures: Test and inspection instructions, troubleshooting guide, disassembly instructions, and adjusting instructions, and demonstration and training videotape if available, detailing essential maintenance and environmental procedures.
5. Maintenance and Service Schedules: Service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
6. Spare Parts List and Source Information: 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.
7. Warranties and Bonds: Copies of warranties and bonds and lists of circumstances and conditions that affect validity of warranties or bonds.

2.4 PRODUCT MAINTENANCE MANUAL

- A. Content: Organize manual into 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.
- B. 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.
- C. Product Information: Include:
 - 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
- D. Environmental Requirements
 - 1. Identify environmentally preferable products incorporated into Project. Include: product model; manufacturer's name, address, phone, and website; and local technical representative.
 - a. Verify plastic products to be incorporated into Project are labeled in accordance with ASTM D1972. Where products are not labeled, provide product data indicating polymeric information in Operation and Maintenance Manual.
 - 1) Type 1: Polyethylene Terephthalate (PET, PETE)
 - 2) Type 2: High Density Polyethylene (HDPE)
 - 3) Type 3: Vinyl (Polyvinyl Chloride or PVC)
 - 4) Type 4: Low Density Polyethylene (LDPE)
 - 5) Type 5: Polypropylene (PP)
 - 6) Type 6: Polystyrene (PS)
 - 7) Type 7: Other. Use of this code indicates that package in question is made with a resin other than the six listed above or is made of more than one resin listed above and used in a multi-layer combination.
 - b. Describe maintenance procedures associated with environmentally preferable materials and systems. Provide cleaning recommendations in accordance with ASTM E1971 and approved Integrated Pest Management (IPM) plan.
 - 1) Include potential environmental impacts of recommended maintenance procedures and materials.
 - 2) Include potential indoor air quality impacts of recommended maintenance procedures and materials.
 - 3) Where proposed maintenance procedures incorporate composting of plastics, assess potential effect of each type of plastic to be included in composting process in accordance with ASTM D5509 or ASTM D6002

- c. Material Safety Data Sheets (MSDS): Include MSDSs as specified.
- 2. Develop environmental management programs for facility as follows:
 - a. Waste management program: Develop in accordance with ASTM E1609. Maximize use of source reduction and recycling procedures outlined in ASTM D5834.
 - b. Indoor Air Quality (IAQ) management program: Provide for evaluation of indoor Carbon Dioxide concentrations in accordance with ASTM D6245. Provide for evaluation of VOCs (volatile organic compounds) in indoor air in accordance with ASTM D6345.
 - c. Water management program: Develop water monitoring program for surface and ground water on project site in accordance with ASTM D5851 and consistent with water management program utilized during construction operations.
- E. Maintenance Procedures: Include manufacturer's written recommendations and inspection procedures, types of cleaning agents, methods of cleaning, schedule for cleaning and maintenance, and 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 affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. 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 warranty and bond information, as described below.
- B. 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.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins.
 - 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.
- D. Maintenance Procedures: Include the following and items detailing 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
- E. 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.
- F. 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.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that affect validity of warranties or bonds.
1. Include procedures and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 GENERAL

- A. At start of project, begin accumulating operation and maintenance data and initiate index. Install and index data in binders within 30 days after delivery of items. As custom written data and test results are produced, add to operation and maintenance data file.
- B. List of Operation and Maintenance requirements has been attached at end of the Division 1 Specifications for your convenience. Intent is to provide an overall summary of requirements and not a comprehensive list. Terms and conditions of the contract require satisfaction of requirements of individual specification sections regardless of what is shown on the list.
- C. Keep operation and maintenance data current. Make operation and maintenance binders available to Contracting Officer for inspection at time of monthly progress payment requests. If operation and maintenance binders are not current, Contracting Officer may retain an appropriate amount of the progress payment.

3.2 MANUAL PREPARATION

- A. Manual Types

1. Emergency Manual: Assemble complete set of emergency information indicating procedures for use by emergency personnel and by NPS operating personnel for types of emergencies indicated.
2. Product Maintenance Manual: Assemble complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into Work.
3. Operation and Maintenance Manuals: Assemble complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

B. Manual Contents: Including:

1. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark sheet to identify product or component incorporated into Work. If data include more than one item in a tabular format, identify each item using appropriate references from Contract Documents. Identify data applicable to Work and delete references to information not applicable.
2. Custom Written Data: For data not in manufacturer's standard literature, provide text, drawings, and schematics specifically applicable to installed systems. Include step-by-step descriptions of operating procedures; identification of individual components and their functions; descriptions of how system components relate to one another and operate together to accomplish a common process or function; and sequence of operation for system control circuits. For seasonally operated systems, provide start-up and shutdown instructions.
3. Equipment Data Sheets: For each item of equipment included in operation and maintenance data, provide Equipment Data Sheet using form at the end of this section. For equipment consisting of a driven machine and a driver (for example, a pump and a motor), equipment data shall cover both the driven machine and the driver. For similar type equipment (for example, multiple exhaust fans of the same model and type), provide a single equipment data sheet with an attached schedule listing individual equipment items.
4. Vendor Furnished As-Built Drawings: Provide for each electrical and each mechanical control system.
 - a. For each control system, provide control circuit schematic drawings. Identify each wire and terminal block number. Show terminal numbers on control devices. Show control wires and devices remote from control panel.
 - b. For each control panel, provide general arrangement drawing showing location of each control component and terminal block on the panel front and interior. Include materials list of panel-mounted control components as well as field-installed control components remote from the panel, identifying components, manufacturer, model number, and initial set points or sensing ranges of devices where applicable.
 - c. For packaged equipment systems, provide general arrangement drawings showing interrelationships of the various items of equipment and components.
 - d. In addition to control wiring schematic, provide power wiring schematic drawing showing power flow to each motor. Identify each power conductor. Show over-current protection and motor starting devices.

C. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23

EQUIPMENT DATA SHEET	
Equipment Item: _____ Designation: _____ Function: _____ Location: _____ Project: _____ Model Number: _____ Serial Number: _____	
Manufacturer Address and Phone:	Supplier Address and Phone:
Preventive Maintenance Tasks:	
Nameplate Data:	
Spare Parts Furnished and Other Information:	

Closeout and Operation & Maintenance (O&M) Requirements

National Park Service (NPS) - Denver Service Center (DSC) | 7-7-2023

Topic	Specification Section	Requirement	Submittal Date	Completed	Received by Park
Project Record Drawings	230000	HVAC Red Line Drawings			
	260000	Electrical Red Line Drawings			
	264100	Lightning Protection System			
System Demonstration and Training		None			
Tools Spare Parts Equipment		None			
Extra Stock		None			
Reports	013523	Safety Reports			
	028233	Removal and disposal of asbestos - field test reports			
	028333	Removal and disposal of lead based paint - field test reports			
	230593	HVAC testing, adjusting, and balancing reports.			
Keys & Keying Schedule	081433	Stile and Rail Wood Doors - Instructions for cydrical lock sets			
O&M Data Warranties Guarantees	079200	Manufacturer Warranties			
	081433	Manufacturer warranties			
	085200	Manufacturer warranties			
	099133	Manufacturer warranties			
	230000	Manufacturer warranties			
	233413	HVAC fans Operation and maintenance manual. Manufacturer provided warranty approved by engineer.			
	260511	Manufacturer warranties			
	265100	Lighting			
	264100	Lightning Protection System - Record Manuals, Electrical Contractor Warranties			

SECTION 021500 - BRACING AND SHORING

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. Scaffolding, bracing and shoring design by a Professional Engineer registered in the State of North Carolina is required for all scaffolding design and/or bracing and shoring needed for the disassembly of the existing lantern, drum and roof systems, and for reconstruction/reinstallation of the same. All scaffolding, shoring and bracing design shall fall under the responsibility of a single scaffolding, shoring and bracing engineer.
- B. This section includes the following:
 - 1. Requirements for the scaffolding, bracing and shoring design.
 - 2. Selection of construction sequence.
 - 3. Temporary scaffolding, bracing and shoring of the structure or portions of the structure to prevent the structure from becoming unsafe during construction.
 - 4. Construction and removal of all posts, lagging, braces, etc. required in connection with bracing and shoring.
 - 5. Coordinate this work with the scaffolding, bracing and shoring requirements shown on the scaffolding, bracing and shoring drawings.

1.3 REFERENCES (LATEST EDITIONS)

- A. 2018 North Carolina State Building Code: Existing Building Code
- B. 2018 North Carolina State Building Code: Building Code
- C. ASCE 7-16
- D. SEI / ASCE 37-14

1.4 SUBMITTALS

- A. Working drawings showing layout, member sizes, connection details, and construction sequence for all bracing and shoring activity.
- B. If required by the Contracting Officer, design calculations of bracing and shoring, showing all member stresses and connections due to imposed loads.

- C. No work related to bracing or shoring shall take place until after the Contracting Officer has received and approved the working drawings and, if required by the Contracting Officer, design calculations.

1.5 QUALIFICATIONS

- A. Design calculations and working drawings of all proposed bracing and shoring of the structure shall be prepared, stamped, and signed by a Professional Engineer registered in the State of North Carolina.

1.6 DESIGN REQUIREMENTS

- A. The bracing and shoring systems required to provide temporary support of the structure or portions of the structure during disassembly and reconstruction shall be designed to support the dead, live, soil, earthquake and wind loads that may be imposed on the structure during construction in accordance with industry standards and generally accepted engineering principles, including SEI/ASCE 37-14 "Design Loads on Structures During Construction."
- B. The stability and integrity of the structure during construction shall be maintained at levels generally acceptable within the construction industry by the use of bracing and shoring. All shoring shall be stable under all loading conditions including tension, compression, and horizontal loads from the thrust of any diagonal members. In no case shall the structure be allowed to become unsafe during construction, as defined by the local governing jurisdiction. Design stresses in bracing and shoring shall not exceed the stresses allowed by Code.
- C. If scaffolding is taken to grade, all scaffolding systems shall be free-standing and be designed so that they do not transfer lateral loads into the lighthouse. Any elements that touch the Cape Lookout Lighthouse will require approval from the Contracting Officer and will additionally require restoration of any damaged lighthouse material, including abrasion and connection points.
- D. Any scaffolding, shoring, or bracing system not taken to grade shall be designed so that lateral loads on the lighthouse do not increase more than 10% and gravity loads do not increase more than 5% beyond existing on any structural element.
- E. For any areas of the lighthouse that must be accessed by scaffolding, the areas must be accessible by a stair system, not a vertical ladder.

PART 2 - PRODUCTS

2.1 MATERIALS FOR SHORING AND BRACING

- A. Materials for shoring and bracing shall be undamaged, high quality materials.

PART 3 - EXECUTION

3.1 CONSTRUCTION

- A. The Contractor shall hire the Engineer responsible for the design of bracing and shoring and inspection of the work as detailed on the bracing and shoring and working drawings, prior to cutting or removing any portion of the structure.
- B. Construction of bracing and shoring shall be in accordance with the received drawings prepared by the Contractor's Engineer.
- C. The Engineer responsible for design of bracing and shoring shall observe the bracing and shoring onsite and shall notify the Contracting Officer in writing (email acceptable) certifying that construction of bracing and shoring was completed in accordance with the bracing and shoring working drawings and meets his/her approval, prior to cutting, removal, or modification of any portion of the structure.
- D. Construction of bracing and shoring shall be observed and approved by the Contracting Officer prior to cutting, removal, or modification of any portion of the structure. The Contracting Officer will provide written notification to the Contractor to proceed with the work within seven (7) days of the final observation of the shoring.
- E. Bracing and shoring shall not be removed until all new portions of the work have sufficient strength to support their weight and the loads superimposed thereon safely. In no case may any bracing or shoring be removed until the work has been approved and reviewed by the Contracting Officer.
- F. Remove surplus excavated materials from site.
- G. It is absolutely imperative that the scaffolding, shoring, and bracing contractor has full access to all drawings and specifications, especially all Historic Preservation requirements of the job. In addition, it is required that the scaffolding, shoring, and bracing installer has reviewed all Historic Preservation requirements with the General Contractor and Contracting Officer and has agreed that they can work within these limitations.

END OF SECTION 021500

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- C. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

1.3 MATERIALS OWNERSHIP

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

1.4 PREINSTALLATION MEETINGS

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

1.5 INFORMATIONAL SUBMITTALS

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

1.6 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Contracting Officer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. 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.
- E. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 - 3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
- F. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 12 inches or more.
- G. Storage or sale of removed items or materials on-site is not permitted.
- H. 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.

1.7 COORDINATION

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- D. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

3.2 PREPARATION

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

3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.

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

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

3.4 SELECTIVE DEMOLITION, GENERAL

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

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and for at least 2 hours after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."

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

C. Work in Historic Areas: Selective demolition may be performed only in areas of Project that are not designated as historic. In historic spaces, areas, and rooms, or on historic surfaces, the terms "demolish" or "remove" shall mean historic "removal" or "dismantling" as specified in Section 024296 "Historic Removal and Dismantling."

D. Removed and Salvaged Items:

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

E. Removed and Reinstalled Items:

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

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

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

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

3.6 DISPOSAL OF DEMOLISHED MATERIALS

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

3.7 CLEANING

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

END OF SECTION

SECTION 024119 - SELECTIVE STRUCTURAL DISASSEMBLY

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Disassembly and removal of selected portions of the building or structure.
 - 2. Disassembly and removal of selected site elements.
 - 3. Salvage of existing items to be reused or recycled.

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 Salvage: Detach items from existing construction and deliver them to Owner.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. 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.

1.3 SELECTIVE DISASSEMBLY SCHEDULE

- A. Existing Construction to Be Removed: All deteriorated or damaged building material, as noted on the drawings or approved by the Contracting Officer.
- B. Existing Items to Be Removed and Salvaged: All historical material in good, sound condition which can be salvaged.
- C. Existing Items to Be Removed and Reinstalled: All historical material in good, sound condition which can be salvaged for reinstallation in its original location.
- D. Existing Items to Remain: All historic material in good, sound condition which can remain undisturbed during construction.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, disassembly 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 disassembly remain the property of Owner.

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

1.5 PREINSTALLATION MEETINGS

- A. Predisassembly Conference: Conduct conference at Project site to review methods and procedures related to selective disassembly including, but not limited to, the following:
 1. Inspect and discuss condition of construction to be selectively disassembled.
 2. Review structural load limitations of existing structure.
 3. Review requirements of work performed by other trades that rely on substrates exposed by selective disassembly operations.
 4. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Predisassembly Photographs:
 1. Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective disassembly operations. Submit before Work begins.

1.7 QUALITY ASSURANCE

- A. Qualifications: An experienced firm that has specialized in disassembly work similar in material and extent to that indicated for this Project and a minimum of five years of experience in selective disassembly of historic structures.

1.8 FIELD CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- B. Notify Contracting Officer of discrepancies between existing conditions and Drawings before proceeding with selective disassembly.
- C. Storage or sale of removed items or materials on-site is not permitted.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective disassembly operations.
- B. Inventory and record the condition of items to be removed and reinstalled, and items to be removed and salvaged.
- C. When unanticipated 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 the Contracting Officer.
- D. Perform surveys as the Work progresses to detect hazards resulting from selective disassembly activities.

3.2 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective disassembly area.
 - 2. Provide temporary weather protection, during interval between selective disassembly of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
- B. Remove temporary barricades and protections where hazards no longer exist.

3.3 SELECTIVE DISASSEMBLY

- A. General: Disassemble 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 disassembly systematically, from higher to lower level. Complete selective disassembly 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.
 - 5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.

6. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 7. Locate selective disassembly equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 8. Preparing the Joints:
 - a. Clean areas of loose dirt and debris using a stiff bristle brush and remove all extraneous fastenings and devices in locations designated for repointing.
 - b. Install necessary protection of adjacent building materials, property and persons from joint cleaning work and dirt. Control dust and dirt from raking work.
 9. Joint Cutting and Raking:
 - a. Cut and rake old mortar from existing joints by hand using hand tools or an Arbortech tool or other approved methods in locations designated for repointing.
 - b. Remove mortar from joints to depth of 5/8 inch.
 - c. Do not remove unsound mortar more than 1-1/2 inches deep; consult Engineer for direction.
 - d. If bricks are loose, relay bricks following procedures in Section 040322 "Historic Brick Unit Masonry Repair" and Section 040323 "Historic Brick Unit Masonry Repointing."
 - e. If the bricks are not loose and the mortar at 5/8" depth is sound prepare the joints as follows to receive mortar.
 - f. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar.
 - g. Avoid over cutting ends of vertical joints, widening joints or cutting into bedding faces of masonry units.
 - h. While raking out joints, remove all metal fittings such as nails, brackets and clips on both horizontal and vertical surfaces, unless otherwise indicated to remain in place.
 - i. Carefully clean out the prepared face with a soft or stiff bristle brush, or blow the joints clean with low-pressure compressed air (40-60 psi).
 - j. Thoroughly flush out joint with clean, clear water.
- B. Reuse of Building Elements: Do not disassemble building elements beyond what is indicated on Drawings without Contracting Officer's approval. It is required that all original material in good condition is reused.
- C. Site Access and Temporary Controls: Conduct selective disassembly and debris-removal operations to ensure minimum interference with walkways and other adjacent occupied and used facilities.
- D. Removed and Salvaged Items:
1. Clean salvaged items.
 2. As soon as elements are disassembled, and before storage, immediately treat metal elements with corrosion inhibitor, per Manufacturer's recommendations. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
 - a. CorrosionPro Lube
 - 1) West Marine
 - b. CRC Heavy-Duty Corrosion Inhibitor
 - 1) CRC Industries
 - c. LPS 3

- 1) LPS Laboratories
 - d. Or Approved Equal.
 - 1) Brand Name or Equal Salient Characteristics that an equal must meet are delineated below:
 - 2) Physical: Liquid.
 - 3) Functional: Heavy duty corrosion inhibitor coating, safe on all metals.
 - 4) Performance: Long-term protection of metal elements and surfaces against moisture intrusion resulting in rust and corrosion where the surface being protected is exposed directly to the elements.
 3. Pack or crate items after cleaning and treatment. Identify contents of containers.
 4. Store items in a secure area until delivery to Owner.
 5. Transport items to Owner's storage area designated by Contracting Officer on mainland Park property (Harkers Island).
 6. Protect items from damage during transport and storage.
- E. Removed and Reinstalled Items:
1. Clean items intended reuse and reinstallation.
 2. As soon as elements are disassembled, and before storage, immediately treat metal elements with corrosion inhibitor, per Manufacturer's recommendations. Acceptable products are:
 - a. CorrosionPro Lube
 - 1) West Marine
 - b. CRC Heavy-Duty Corrosion Inhibitor
 - 1) CRC Industries
 - c. LPS 3
 - 1) LPS Laboratories
 3. Pack or crate items after cleaning and treatment. Identify contents of containers.
 4. Store items in a secure area until delivery to Owner.
 5. Transport items to Owner's storage area designated by Contracting Officer on mainland Park property (Harkers Island).
 6. Protect items from damage during transport and storage.
 7. Repair items to functional condition adequate for intended reuse.
 8. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- F. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective disassembly. When permitted by the Contracting Officer, items may be removed to a suitable, protected storage location during selective disassembly and reinstalled in their original locations after selective disassembly operations are complete.

3.4 SALVAGE SCHEDULE

- A. All cast or wrought iron used by a foundry for replication but not noted to be reinstalled shall be returned to the Owner.
- B. All iron not used specifically by a foundry for replication and not noted to be reinstalled (i.e., 1980s steel) shall be returned to the Owner.

3.5 CLEANING

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove disassembly waste materials from Project site and dispose of them in an EPA-approved construction and disassembly waste landfill acceptable to authorities having jurisdiction.
 - 1. Do not allow disassembled 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 disassembled materials.
- C. Return adjacent areas to condition existing before selective disassembly operations began.

END OF SECTION 024119

SECTION 024296 - HISTORIC REMOVAL AND DISMANTLING

PART 1 - GENERAL

1.1 SUMMARY

- A. This specification section covers historic treatment procedures for disassembling or detaching a historic item from a surface, or a non-historic item from a historic surface, using gentle methods and equipment to prevent damage to historic items and surfaces.
- B. Related Requirements:
 - 1. Section 013591 "Historic Treatment Procedures" for general historic treatment requirements.
 - 2. Section 024119 "Selective Disassembly" for documentation, disassembly, and removal of selected portions of building or structure, for disassembly and removal of selected site elements, and for salvage of existing items to be reused or recycled.

1.2 DEFINITIONS

- A. Dismantle: To disassemble or detach a historic item from a surface, or a nonhistoric item from a historic surface, using gentle methods and equipment to prevent damage to historic items and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- B. Existing to Remain: Existing items that are not to be removed or dismantled, except to the degree indicated for performing required Work.
- C. Remove: To take down or detach a nonhistoric item located within a historic space, area, or room, using methods and equipment to prevent damage to historic items and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- D. Retain: To keep existing items that are not to be removed or dismantled.
- E. Salvage: To protect removed or dismantled items and deliver them to Owner.

1.3 PRECONSTRUCTION MEETINGS

- A. Preconstruction Conference(s): Conduct conference(s) at Project site.
 - 1. Review list of items indicated to be salvaged.
 - 2. Review methods and procedures related to removal and dismantling work.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For historic removal and dismantling specialist.

- B. Preconstruction Documentation: Show preexisting conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by Contractor's removal and dismantling operations.
- C. Architectural Component Documentation Program: Contractor shall be responsible for developing and executing a written architectural component documentation program prior to the disassembly of any portions of the lighthouse.
 - 1. All individual ironwork elements of the lighthouse, both at the interior and exterior of the structure, must be documented, noting specific geometry, connections and location, ensuring that enough information is captured to reconstruct upper portion of the lighthouse accurately and with sensitivity to the historic condition.
 - 2. Overall geometry and details of brick masonry must be documented prior to the disassembly of upper portion of the lighthouse.
 - 3. Contractor shall develop a numbering system to ensure comprehensive cataloging of the metal and wood items to be repaired and salvaged. Tag all elements with numbered tags which will survive treatment.
- D. Inventory of Salvaged Items: After removal or dismantling work is complete, submit a list of items that have been salvaged.

1.5 QUALITY ASSURANCE

- A. Historic Removal and Dismantling Specialist Qualifications: A qualified historic treatment specialist. General selective demolition experience is insufficient experience for historic removal and dismantling work.
 - 1. Award disassembly and removal work to firm regularly engaged in disassembling and replicating historic building elements and materials similar to the work required by this Section that can demonstrate to Owner's satisfaction that, within previous ten years, the firm has successfully performed and completed in a timely manner at least three projects similar in scope and type to work required on this Project involving buildings designated as Landmarks by local governmental authorities, buildings listed in the National Register of Historic Places, or buildings listed in a State Register of Historic Places under the direction of preservation authorities.
- B. Removal and Dismantling Historic Treatment Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of removal and dismantling work, including protection of surrounding and substrate materials and Project site.
- C. Regulatory Requirements: Comply with notification regulations of authorities having jurisdiction before beginning removal and dismantling work. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.6 FIELD CONDITIONS

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

1. Before removal and dismantling, Owner will remove the following items:
 - a. Coast Guard Aid to Navigation and corresponding elements at Watch Level and Lantern Level.
- B. Notify Contracting Officer of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.
- C. Storage or sale of removed or dismantled items on-site is not permitted unless otherwise indicated.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Preparation for Removal and Dismantling: Examine construction to be removed or dismantled to determine best methods to safely and effectively perform removal and dismantling work.
 1. Verify that affected utilities are disconnected and capped.
 2. Inventory and record the condition of items to be removed and dismantled for reinstallation or salvage. Enter this information on the submittal of inventory of salvaged items.
 3. Engineering Survey: 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 as a result of removal and dismantling work.
- B. Perform surveys as the Work progresses to detect hazards resulting from historic removal and dismantling procedures.

3.2 HISTORIC REMOVAL AND DISMANTLING

- A. General: Have removal and dismantling work performed by a qualified historic removal and dismantling specialist.
- B. Anchorages:
 1. Remove anchorages associated with removed items.
 2. Dismantle anchorages associated with dismantled items.
 3. In nonhistoric surfaces, patch holes created by anchorage removal or dismantling according to the requirements for new work.
 4. In historic surfaces, patch or repair holes created by anchorage removal or dismantling according to Section that is specific to the historic surface being patched.

END OF SECTION 024296

SECTION 028233 - REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Remove and dispose approximately 600 linear feet of assumed asbestos containing window glazing located on the exterior of the Lantern Level (9th landing) windows as indicated on Project Drawing H1. Contractor shall retain an asbestos inspector accredited by North Carolina - Health Hazards Control Unit (NC-HHCU) to assess and test window glazing to confirm asbestos content prior to removal of the window glazing. Asbestos containing glazing may be removed from window units in-place, or secure the glazing to the window and remove as a component of the window, to perform ground level or off-site removal of the asbestos containing window glazing. Additional details are available in the Hazardous Building Materials Assessment Report, Cape Lookout Lighthouse, Cape Lookout National Seashore, Harker's Island, North Carolina S&ME Project No. 22130469 dated November 10, 2022.
- B. The Contractor shall assume full responsibility and liability for compliance with all applicable federal, state and local regulations pertaining to work practices, hauling, disposal, protection of workers, visitors to the site and persons occupying areas adjacent to the site. The Contractor shall hold the Owner and Owners Representative harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulation on the part of himself, his employees or his subcontractors.

1.3 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

- A. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- 1. ANSI Z9.2 (1979; R 1991) Fundamentals Governing the Design and Operation of Local Exhaust Systems
- 2. ANSI Z88.2 (1992) Respiratory Protection

- B. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- 1. ANSI C 732 (1995) Aging Effects of Artificial Weathering on Latex Sealants
- 2. ASTM D 522 (1993; Rev. A) Mandrel Bend Test of Attached Organic Coatings

3. ASTM D 1331 (1989; R 1995) Surface and Interfacial Tension of Solution of Surface-Active Agent
4. ASTM 2794 (1993) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
5. ASTM E 84 (1995) Surface Burning Characteristics of Building Materials
6. ASTM E 96 (1995) Water Vapor Transmission of Material
7. ASTM E 119 (1995; Rev. A) Fire Tests of Building Construction and Materials
8. ASTM E 1368 (1990) Visual Inspection of Asbestos Abatement Projects

C. CODE OF FEDERAL REGULATIONS

1. 29 CFR 1910.134 Respiratory Protection
2. 29 CFR 1926.51 Sanitation
3. 29 CFR 1926.200 Accident Prevention Signs and Tags
4. 29 CFR 1926.59 Hazard Communication
5. 29 CFR 1926.1101 Asbestos, Tremolite, Anthophyllite, Actinolite
6. 40 CFR 61, SUBPART A General Provisions
7. 40 CFR 61, SUBPART M National Emission Standards for Asbestos
8. 40 CFR 763 Asbestos Containing Material in Schools

D. ENVIRONMENTAL PROTECTION AGENCY (EPA)

1. EPA 560/5-85-024 Guidance for Controlling Asbestos Containing Materials in Buildings

E. UNDERWRITERS LABORATORIES INC. (UL)

1. UL 586 1990 High-Efficiency, Particulate, Air Filter Units

F. STATE OF NORTH CAROLINA

1. NC Gen Statute 130A-444 through 452 Asbestos Hazard Management Program
2. North Carolina Asbestos Hazard Management Program Rules, 10A NCAC 41C .0600 -

.0611

3. North Carolina Solid Waste Management Rules, 15A NCAC 13B
4. North Carolina Workers Compensation Act, General Statute 97, Department of Insurance, Industrial Commission

1.4 DEFINITIONS

- A. Adequately Wet
To sufficiently mix or penetrate with liquid as to prevent the potential release of particulate.
- B. Aggressive Clearance Sampling
A method of sampling which uses electric fan(s), electric leaf blower, and other devices to simulate vigorous activity in the abated area while air samples are being collected.
- C. AHERA
Asbestos Hazard Emergency Response Act applicable to Kindergarten through Grade 12.
- D. Amended Water
Water containing a wetting agent or surfactant with a surface tension of 29 dynes per square centimeter when tested in accordance with ASTM D 1331.
- E. Area Sampling
Sampling of asbestos fiber concentrations within the asbestos control area and outside the asbestos control area which approximates the concentrations of asbestos in the theoretical breathing zone but is not actually collected in the breathing zone of an employee.
- F. Asbestos
The term asbestos includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite and any of these minerals that has been chemically treated or altered. Materials are considered to contain asbestos if the asbestos content is at least one percent of the material by area.
- G. Asbestos Control Area
That area where asbestos removal operations are performed which is isolated by physical boundaries, which assist in the prevention of the uncontrolled release of asbestos dust, fibers or debris.
- H. Fibers
Those fibers having an aspect ratio of at least 3:1 and longer than 5 micrometers as determined by National Institute for Occupational Safety and Health (NIOSH) Method 7400.
- I. Asbestos Permissible Exposure Limit
A concentration of 0.1 fibers per cubic centimeter of air as an 8-hour time weighted average as determined by 29 CFR 1926.1101 or other federal legislation having legal jurisdiction for the protection of workers health.
- J. ASHARA
Asbestos School Hazard Abatement Reauthorization Act

- K. Background Monitoring
Area sampling performed prior to abatement to obtain an index of airborne fiber levels under typical activity.
- L. Clean Room
An uncontaminated area or room, which is a part of the decontamination enclosure system with provisions for storage of street clothing and protective equipment.
- M. Clearance Monitoring
Area air sampling performed using Phase Contrast Microscopy (PCM) or Transmission Electron Microscopy (TEM) aggressive clearance sampling techniques to determine the airborne concentrations of residual fibers upon conclusion of asbestos abatement.
- N. Contractor
The Contractor is that individual or entity under contract to the Owner to perform the herein-listed work.
- O. Critical Barrier
A leak-tight seal applied from within the work area to isolate vents, windows, doors, and any other cavity or opening to the contaminated work area.
- P. Encapsulants
Specific materials in various forms used to chemically entrap asbestos fibers in various configurations to prevent these fibers from becoming airborne. There are four types of encapsulants as follows, which must comply with performance requirements as specified herein. Use of encapsulants for this project, are limited to removal encapsulants.
- Q. Friable Asbestos Material
Material that contains more than one percent asbestos by area and that can be crumbled, pulverized, or reduced to powder by the forces expected to act upon it during demolition or renovation operations.
- R. HEPA Filter Equipment
High efficiency particulate air (HEPA) filtered vacuum and/or exhaust ventilation equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall retain 99.97 percent of particles 0.3 microns or larger as indicated in UL 586.
- S. Owners Representative/Industrial Hygienist
That industrial hygienist (IH) employed by the Contractor to monitor, sample, and perform testing aspects in accordance with specifications, state and federal requirements.
- T. Non-friable Asbestos Material
Material that contains asbestos in which the fibers have been temporarily locked in by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not normally release asbestos fibers during any appropriate use, handling, storage or transportation. It is understood that asbestos fibers will be released under other conditions such as demolition or removal.

U. Personal Sampling

Air sampling to determine asbestos fiber concentrations within the breathing zone of a specific employee, performed in accordance with 29 CFR 1926.1101. The cost and responsibility of personal sampling is that of the abatement contractor.

V. Regulated Asbestos-containing Material (RACM)

Friable asbestos-containing material; Category I non-friable ACM that has become friable; Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or Category II non-friable ACM that is likely to become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.

W. Time Weighted Average (TWA)

The TWA is an 8-hour time weighted average airborne concentration of asbestos fibers. A full shift sample per work task is required to establish that person's TWA exposure.

X. Wetting Agent

That specific agent used to reduce airborne asbestos levels by physically bonding asbestos fibers to material to be removed. An equivalent wetting agent must have a surface tension of at least 29 dynes per square centimeter as tested in accordance with ASTM D 1331.

1.5 REQUIREMENTS

A. Description of Work

The work covered by this section includes the handling of asbestos containing materials which are encountered during repair, construction and demolition and describes some of the resultant procedures and equipment required to protect workers and occupants of the building or area, or both, from contact with airborne asbestos fibers. The work also includes the disposal of the generated asbestos containing materials. More specific operational procedures will be outlined in the Asbestos Hazard Abatement Plan, to be provided by the contractor, called for elsewhere in this specification.

B. Contractor Responsibilities

The removal and disposal of asbestos containing materials shall be performed by an asbestos abatement contractor licensed by the North Carolina Licensing Board of General Contractors as these materials may release airborne asbestos fibers during demolition or removal and therefore must be handled in accordance with the removal and disposal procedures as specified herein. Asbestos abatement shall be performed in accordance with the OSHA 29 CFR 1926.1101, EPA 40 CFR 61, and state requirements. The Contractor shall assume full responsibility and liability for compliance with all applicable federal, state and local regulations pertaining to work practices, hauling, disposal, protection of workers, visitors to the site and persons occupying areas adjacent to the site. The Contractor shall hold the Owner and Owners Representative harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulation on the part of himself, his employees or his sub-contractors.

C. Treatment of Asbestos Containing Materials

1. Asbestos containing window glazing shall be removed from window units in-place, or secure glazing to the window and remove window as a component to perform ground level or off-

site removal of the asbestos containing window glazing.

2. Removal of the glazing from the window shall be conducted outdoors and requires polyethylene sheeting be placed on ground and surrounding surfaces below the window units prior to abatement activities. Asbestos barrier tape shall establish a control zone around work area to restrict access. Contractor shall use wet methods during removal and bagging for disposal.
3. Onsite area air monitoring shall be responsibility of the Contractor in accordance with specifications and state and federal requirements.

D. Recordkeeping Requirements

1. Medical Requirements

Maintain medical requirements, including but not limited to Medical Surveillance and medical recordkeeping as listed in 29 CFR 1926.1101.

2. Medical Examinations

Before initial exposure and annually, provide workers with a comprehensive medical examination as required by 29 CFR 1926.1101 or other pertinent state or local directives.

3. Medical Records

Maintain complete and accurate records of employees' medical examinations, medical records, and exposure data for a period of 50 years after termination of employment and make records of the required medical examinations and exposure data available for inspection and copying to: The Assistant Secretary of Labor for Occupational Safety and Health (OSHA), or authorized representatives of them, and an employee's physician upon the request of the employee or former employee.

4. Training

Maintain accreditations required by North Carolina - Health Hazards Control Unit (NC-HHCU) for workers and supervisory personnel. License and training shall be no more than one year prior to the assignment to asbestos work, each employee shall be instructed with regard to the hazards of asbestos, safety and health precautions, the use and requirements for protective clothing, equipment, and respirators, and the association of cigarette smoking and asbestos related disease, and all additional requirements of 29 CFR 1926.1101. Each employee shall participate in a respiratory protection program, be furnished a respirator, and fit test administered as required by 29 CFR 1926.59 and 29 CFR 1910.134. Fully cover engineering and other hazard control techniques and procedures whichever is more stringent. The Contractor shall provide documentation to the Owner or Owner's representative upon request.

5. Permits, Licenses and Notifications

Obtain necessary permits and licenses in conjunction with asbestos removal, hauling, and disposition, and furnish timely notification of such actions required by Federal, state, regional, and local authorities. Notify the NC-HHCU with an asbestos abatement notification form 10 days prior to the commencement of work in accordance with 40 CFR 61, SUBPART M and NC-HHCU regulations.

6. Safety and Health Compliance

In addition to detailed requirements of this specification, comply with those applicable laws, ordinances, criteria, rules, and regulations of federal, state, regional, local authorities regarding handling, storing, transporting, and disposing of asbestos waste materials. Comply with the applicable requirements of NCDEHNR, 29 CFR 1926.1101, 40 CFR 61, SUBPART A, 40 CFR 61, SUBPART M and 40 CFR 763. Submit matters of interpretation of standards to the appropriate administrative agency and Owner's representative for resolution before starting the work. Where requirements of this specification, applicable laws, rules, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirement shall apply.

7. Respiratory Protection Program

Establish and implement a respirator program as required by ANSI Z88.2, 29 CFR 1910.134 and 29 CFR 1926.1101.

8. Industrial Hygienist (IH)

Individual hired by the Contractor who develops the Asbestos Hazard Abatement Work Plan, and is responsible for air sampling (as applicable by state and federal law) under the direction of an Industrial Hygienist currently certified for comprehensive practice by the American Board of Industrial Hygiene.

9. Hazard Communication

Adhere to all parts of 29 CFR 1926.59 and provide a copy of the Material Safety Data Sheets (MSDS) for all materials brought to the site.

1.6 SUBMITTALS

A. Manufacturer's Catalog Data

1. High Efficiency Particulate (HEPA) Vacuums
2. Encapsulant

B. Statements

1. Asbestos Hazard Abatement Work Plan

Contractor shall submit a detailed plan of the safety precautions, specific work procedures and sequence to be used in the removal and disposal of materials containing asbestos. The plan shall include but not be limited to the precise personal protective equipment to be used, the location of asbestos control areas, removal methods of each ACM, interface of trades involved in the construction, sequencing of asbestos related work, disposal plan, type of wetting agent, and a detailed description of the methods to be employed to control pollution. The abatement plan must be approved prior to the start of any asbestos abatement activities. Once reviewed and accepted by the Owner's Representative, the plan will be enforced as if an addition to the specification.

2. Landfill Approval

Submit written evidence that the landfill is approved for asbestos disposal by the North Carolina Department of Environmental Quality (NCDEQ). Submit detailed delivery tickets, prepared, signed and dated by an agent of the landfill, certifying the amount of asbestos materials delivered to the landfill, within three days after delivery.

3. Employee Training
Submit NC-HHCU accreditations for each employee indicating that the employee has received training in the proper handling of materials that contain asbestos; understands the health implications and risks involved, including the illnesses possible from exposure to airborne asbestos fibers; understands the use and limits of the respiratory equipment to be used; and understands the results of monitoring of airborne quantities of asbestos as related to health and respiratory equipment as indicated in 29 CFR 1926.1101, 40 CFR 763 and maintains licensing on an annual basis.
4. Medical Certification Statement
Provide a written statement that all workers and supervisors have met or exceeded all medical prerequisites listed herein and in 29 CFR 1926.1101 and 29 CFR 1910.134.
5. Respiratory Protection Statement
Submit a written statement of compliance with OSHA 29 CFR 1910.134.
6. NC-HHCU Asbestos Project License
NC-HHCU Asbestos Removal Permit shall be obtained by the contractor and provided to the Owner's representative prior to work activities, to include designated landfill approved for disposal of asbestos containing materials.

C. Field Test Reports

1. Personal Air Sampling Results
Complete fiber counting for personal air samples in accordance with 29 CFR 1926.1101 of the OSHA and maintain on the job site. Submit sampling results to the Owner and the affected Contractor employees within 16 hours of sample extraction, signed by the testing laboratory performing air sampling, or the employee that analyzed the sample. Personal monitoring as required by the OSHA is the responsibility of the Contractor. The Contractor shall include cost of such monitoring in the Base Bid.
2. Daily Field Reports
Daily field records must be submitted to the Owner on a weekly basis. Field reports must log individuals on-site and record work practices and notable incidents of the day.
4. Asbestos Disposal Quantity Report
Contractor shall submit at the completion of project, the quantity of asbestos waste disposed.

PART 2 PRODUCTS

2.1 ENCAPSULANT

Shall conform to current USEPA requirements, shall contain no toxic or hazardous substances, no solvents and shall conform to the following performance requirements.

A. Removal Encapsulant

Requirement

Flame Spread - 25, Smoke Emission -50

Combustion Toxicity Zero Mortality

Life Expectancy - 20 years

Permeability - Minimum 0.4 perms

Test Standard

ASTM E84

University of Pittsburgh
ProtocolASTM C 732, Accelerate
Aging Test

ASTM E 96

B. Lockdown Encapsulant

Requirement

Flame Spread - 25, Smoke Emission -50

Combustion Toxicity Zero Mortality

Life Expectancy - 20 years

Permeability - Minimum 0.4 perms

Test Standard

ASTM E84

University of Pittsburgh
ProtocolASTM C 732, Accelerate
Aging Test

ASTM E 96

2.2 POLYETHYLENE SHEETING

Polyethylene sheeting shall be fire retardant and conform to National Fire Protection Act and the following performance requirements.

A. 4-mil polyethylene sheeting

Requirement

Flame Spread - 10

Smoke Development - 70

Char: 1050 MM Maximum Individual - Pass

Drip Burn: 2 Sec Maximum Individual - Pass

After Flame: 2 Sec Maximum Individual - Pass

Test Standard

ASTM E84

ASTM E84

NFPA 701

NFPA 701

NFPA 701

B. 6-mil polyethylene sheeting

Requirement

Flame Spread - 15

Smoke Development - 75

Char: 1050 MM Maximum Individual - Pass

Drip Burn: 2 Sec Maximum Individual - Pass

After Flame: 2 Sec Maximum Individual - Pass

Test Standard

ASTM E84

ASTM E84

NFPA 701

NFPA 701

NFPA 701

PART 3 EXECUTION

3.1 EQUIPMENT

Make available to the Owner or the Owner's Representative who are qualified to use, two complete sets of personal protective equipment as required herein for entry to the asbestos control area. Provide manufacturer's certificate of compliance for all equipment required to contain airborne

asbestos fibers.

A. Respirators

Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.

B. Protective Clothing

Provide personnel exposed to asbestos with disposable full body protective clothing, to include head coverings, gloves, and foot coverings. Provide disposable plastic or rubber gloves for comfort, but shall not be used alone. Make sleeves secure at the wrists, make foot coverings secure at the ankles, and make clothing secure at the neck by the use of tape.

C. Decontamination Process

Removal of the friable (regulated) materials in an exterior environment requires a decontamination process, to include resources to clean and change contaminated personal protective equipment and abatement equipment. Decontamination procedures shall comply with 29 CFR 1926.1101 and NC-HHCU, and at a minimum, must consist of HEPA vacuuming and removing asbestos contaminated disposable protective clothing while still wearing respirators at the boundary of the asbestos work area and sealing in impermeable bags or containers for disposal. Dispose of protective clothing as asbestos waste. Do not wear work clothing between home and work.

1. Warning Signs and Labels

Provide warning signs at all approaches to the asbestos control areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide labels and affix to all asbestos materials, scrap, waste, debris, and other products contaminated with asbestos. Appropriate signage in accordance with 29 CFR 1926.1101 shall be established for all asbestos removals.

a. Warning Signs

Provide vertical format conforming to CFR 1926.200 and 29 CFR 1926.1101 minimum 20 by 14 inches displaying the following legend in the lower panel:

<u>Legend</u>	<u>Notation</u>
Danger	1-inch Sans Serif gothic or Block
Asbestos	1-inch Sans Serif gothic or Block
May Cause Cancer	1/4 inch Sans Serif gothic or Block
Causes Damage to Lungs	1/4 inch Sans Serif gothic or Block
Authorized Personnel Only	1/4 inch Sans Serif gothic or Block

Spacing between lines shall be at least equal to the height of the upper of any two lines.

b. Warning Labels

Provide labels conforming to 29 CFR 1926.1101 of sufficient size to be clearly legible, displaying the following legend:

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY

2. **Local Exhaust System**
Provide a local exhaust system in friable or regulated asbestos control areas in accordance with ANSI Z9.2 and CFR 1926.1101 that will provide at least four air changes per hour inside the NPE. Local exhaust equipment shall be operated 24 hours per day, until the asbestos control area is removed and shall be leak proof to the filter and equipped with HEPA filters. Maintain a minimum pressure differential in the control area of minus 0.02 inches of water column relative to adjacent, unsealed areas and record a minimum four times daily. Provide continuous 24-hour per day monitoring of the pressure differential with a pressure differential automatic recording instrument. Filters on exhaust equipment shall conform to ANSI Z9.2 and UL 586. The local exhaust system shall terminate out of doors and remote from any public access or ventilation system intakes.
3. **Tools**
Vacuums shall be leak proof to the filter and equipped with HEPA filters. Filters on vacuums shall conform to ANSI Z9.2 and UL 586. Do not use power tools to remove asbestos containing materials unless the tool is equipped with effective, integral HEPA filtered exhausts ventilation systems. Remove all residual asbestos from reusable tools prior to storage or reuse.

4.1 WORK PROCEDURE

- A. Perform asbestos removal and disposal in accordance with 29 CFR 1926.1101, 40 CFR 61 Subpart M, and NC-HHCU, and as specified herein. Eating, smoking, drinking, or applying cosmetics shall not be permitted in the asbestos work or control areas. Personnel of other trades not engaged in the removal and demolition of asbestos containing materials shall not be exposed at any time to airborne concentrations of asbestos unless all the personnel protection provisions of this specification are complied with by the trade personnel. Shut down the heating, ventilating, and air conditioning system in the area of work, and seal the openings to the system prior to the commencement of asbestos work. Disconnect electrical service when wet removal is performed and provide temporary electrical service with verifiable ground fault circuit interrupter (GFCI) protection prior to the use of any water. If an asbestos fiber release or spill occurs outside the asbestos control area, stop work immediately, correct the condition to the satisfaction of the Owner or their Representative including clearance sampling, prior to resuming work.
- B. **Protection of Existing Work to Remain**
Perform work without damage or contamination of adjacent work. Where such work is damaged or contaminated as verified by the Owner's Representative using visual inspection or sample analysis, it shall be restored to its original condition or decontaminated by the contractor at no expense to the Owner as deemed appropriate by the Owner's Representative. This includes inadvertent spill of dirt, dust, or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, stop work immediately. Then clean up the spill at the Contractor's expense. When satisfactory visual inspection and air sampling results are obtained from the Owner's Representative work may proceed at the discretion of the Owner's Representative.
- C. **Furnishings**

The Owner and General Contractor will coordinate any appropriate furniture and equipment removal (i.e. cabinets, electronics, moveable lockers, etc.) before asbestos work begins.

D. Pre-cleaning

Wet wipe and HEPA vacuum all surfaces potentially contaminated with asbestos prior to establishment of an enclosure.

E. Enclosure

Negative pressure enclosures for friable (regulated) removals shall consist of critical barriers, wall, floor and ceiling polyethylene sheeting, where applicable. All polyethylene sheeting used indoors shall be fire retardant. Surfaces scheduled for removal do not require polyethylene coverings. Contiguous five-stage decontamination unit shall consist of a workroom, airlock, shower with hot and cold water, airlock and clean room. Critical barriers and the decontamination coverings shall be constructed of a minimum 2-layers of 6-mil polyethylene. Wall and ceiling coverings, where applicable, shall be constructed of a minimum 4-mil polyethylene. Floor coverings shall consist of two layers of 6-mil polyethylene sheeting. Negative pressure shall be established, maintained and recorded as stated herein. Provide local exhaust system in all asbestos control areas. Openings will be allowed in enclosures of asbestos control areas only for personnel and equipment entry and exit, the supply and exhaust of air for the local exhaust system and the removal of properly containerized asbestos containing materials. Replace local exhaust system filters as required to maintain the efficiency of the system. Establish designated limits for the asbestos work area with the use of continuous barriers and maintain all other requirements for asbestos control areas. If the quantity of airborne asbestos fibers monitored at the designated limits at any time exceed 0.01 fibers per cubic centimeter via Phase Contrast Microscopy (NIOSH 582), stop work, evacuate personnel in adjacent areas or provide personnel with approved protective equipment at the discretion of the Owner's Representative. If adjacent areas are contaminated as determined by the Owner's Representative, clean the contaminated area, monitor and visually inspect the area as specified herein. The glue, tape, fasteners, spray-glue, etc. used to secure polyethylene sheeting shall not leave a residue upon removal, and the Contractor is responsible for damage to substrate or paint finishes resulting from removal of such products.

F. Asbestos Handling Procedures

Remove material, allow for minimal accumulations and immediately place in 6-mil polyethylene disposal bags. No waste shall remain in the containment at the end of the day unless properly sealed in disposal bags or equivalent.

G. Site Inspection

While performing asbestos removal work, the Contractor shall be subject to on-site inspection by the Owner's Representative. If the work is in violation of specification requirements, the Owner's Representative may issue a stop work order to be in effect immediately and until deficiencies are corrected. Standby time and associated expenses shall be the responsibility of the Contractor.

H. Air Monitoring

The Owner's IH shall perform air monitoring as required by NC-HHCU regulations. The air monitoring shall be performed by an individual accredited by NC-HHCU as an Asbestos Air Monitor and the analysis of air samples for this project shall be Phase Contrast Microscopy (PCM) NIOSH 7400.

1. Area air monitoring shall be conducted during abatement activities involving window glazing.
2. Air monitoring onsite shall be conducted in the vicinity and boundaries of abatement activities.

I. Clean-up and Disposal

1. Housekeeping

Essential parts of asbestos dust control are housekeeping and clean-up procedures. Maintain surfaces of the asbestos control area free of accumulations of asbestos fibers. Give meticulous attention to restricting the spread of dust and debris; keep waste from being distributed over the general area. Contractor shall use HEPA filtered vacuum cleaners.

2. Final Inspection and Air Clearance at Secondary Location

When asbestos removal is complete, all asbestos waste is removed from the work area, and final clean-up is completed at secondary location, the project IH and the Contractor will visually inspect all surfaces within the work area for residual material or accumulated dust or debris. The Contractor shall re-clean all areas showing dust or residual materials. Encapsulant may not be applied or any of the work area components dismantled until an acceptable final inspection is conducted. Following an acceptable final inspection, and acceptable air sampling data, the IH shall provide written acceptance of the work to the Contractor.

3. Title to Materials

All materials resulting from demolition work, except as specified otherwise, shall become the property of the Contractor and shall be disposed as specified in applicable local, state and federal regulations and herein.

4. Disposal of Asbestos

- a. Procedure for Disposal

Collect asbestos waste, asbestos contaminated water, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing which may produce airborne concentrations of asbestos fibers and place in sealed fireproof, waterproof, non-returnable containers (e.g. double 6-mil bags, cartons, drums or cans). Wastes within the containers must be wetted to ensure security of the material in case of container breaching. Affix a warning and Department of Transportation (DOT) label to each bag or use at least 6-mil thick bags with the approved warnings and DOT labeling reprinted on the bag. The name of the waste generator and the location at which the waste was generated shall be clearly indicated on the outside of each container. Dispose of waste asbestos material at a NCDEQ approved asbestos landfill. For temporary storage, store sealed impermeable bags in asbestos metal dumpsters or containers. An area for interim storage of asbestos waste-containing metal dumpster or container will be assigned by the Owner's Representative. Metal dumpsters or containers in which asbestos waste is temporarily stored at the abatement site shall be lined with 6-mil polyethylene sheeting to prevent contamination and shall have doors and tops. The doors and tops shall be closed and locked except during loading or unloading asbestos waste. Procedure for hauling and disposal shall comply with 40 CFR 61, SUBPART M, and state, regional and local standards. Sealed plastic bags may be dumped from

metal dumpsters or containers into the burial site unless the bags have been broken or aged. Unloading of metal dumpsters or containers by tipping or tilting is permitted without re-inspecting individual bags or provided there are no visible emissions. Following the removal of all containerized waste, polyethylene sheeting shall be removed and discarded in bags or drums along with contaminated cleaning materials and protective clothing.

- b. After asbestos waste has been unloaded, the truck cargo area or waste container, including the floor, walls and ceiling, shall be decontaminated using wet methods or a vacuum equipped with a HEPA filter until no visible residues remain.

END OF SECTION

SECTION 028333 – ABATEMENT OF LEAD-BASED PAINT

PART 1 - GENERAL

1.1 SUMMARY

- A. Perform abatement of lead-based paint surfaces as described herein and as indicated on Project Drawing H1. Abatement activities on various surfaces may include mechanical removal of lead-based paint, chemical removal of lead-based paint, removing loose and flaking paint by scraping, wet-sanding, cleaning and surface preparation for repainting, and disposing of lead-based paint waste. Additional details are available in the Hazardous Building Materials Assessment Report, Cape Lookout Lighthouse, Cape Lookout National Seashore, Harker's Island, North Carolina S&ME Project No. 22130469 dated November 10, 2022.

Lead-based paint is located on the following surfaces.

1. Interior stairs and handrails (black paint on metal) – deteriorated condition
 2. Center stairway supports/conduit (black paint on metal) – deteriorated condition
 3. Structural steel and ceiling on first landing (green paint on metal) – non-deteriorated condition
 4. Structural steel and components on the Lantern Level (9th landing) - white paint on metal) – non-deteriorated
- B. Remove and prepare for repainting those lead-based paints which are loose, flaking, exhibit rust or are otherwise compromised. Lead-based paint which is adhered, in good condition, and exhibits no otherwise compromising features shall remain and be prepared for repainting per project requirements. Use care to maintain the substrates and associated components.
- C. Remove lead-based paint to bright metal on those components scheduled to be physically removed from the Lantern level (9th landing). The lead-based paint will be removed complete after transfer to an off-site location and prior to repair and repainting.
- D. The treatment, removal and disposal of lead-based paint shall be performed by a firm and employees that maintain certification in accordance with 40 CFR 745, the Environmental Protection Agency (EPA) Lead Renovation, Repair, and Painting Rule. The Contractor shall assume full responsibility and liability for compliance with all applicable federal, state, and local regulations pertaining to work practices, hauling, disposal, protection of workers, visitors to the site and persons occupying areas adjacent to the site. The Contractor shall hold the Owner and Owner's Representative harmless for failure to comply with any applicable work, hauling, disposal, safety, health, or other regulation on the part of himself, his employees, or his subcontractors.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

1. ANSI Z88.2 (1992) Respiratory Protection
2. ANSI Z9.2 (R1991) Local Exhaust Systems

B. CODE OF FEDERAL REGULATIONS (CFR)

- | | |
|--------------------|---|
| 1. 29 CFR 1926.21 | Safety Training and Education |
| 2. 29 CFR 1926.33 | Access to Employee Exposure and Medical Records |
| 3. 29 CFR 1926.55 | Gases, Vapors, Fumes, Dusts, and Mists |
| 4. 29 CFR 1926.59 | Hazard Communication |
| 5. 29 CFR 1926.62 | Lead Exposure in Construction |
| 6. 29 CFR 1926.65 | Hazardous Waste Operations and Emergency Response |
| 7. 29 CFR 1926.103 | Respiratory Protection |
| 8. 40 CFR 260 | Hazardous Waste Management |
| 9. 40 CFR 261 | Identification and Listing of Hazardous Waste |
| 10. 40 CFR 262 | Generators of Hazardous Waste |
| 11. 40 CFR 263 | Transporters of Hazardous Waste |
| 12. 40 CFR 745 | Requirements for Lead-Based Paint Activities |

C. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

- | | |
|-------------------|---|
| 1. HUD Guidelines | (1995) Control of Lead-Based Paint Hazards in Housing |
|-------------------|---|

2.3 DEFINITIONS

- A. Action Level
Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8-hour period in an occupational or industrial environment.
- B. Competent Person (CP)
As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of lead hazards in accordance with current federal, state, and local regulations.
- C. Decontamination Room: Room for removal of contaminated personal protective equipment (PPE).
- D. Eight-Hour Time Weighted Average (TWA)
Airborne concentration of lead to which an employee is exposed, averaged over an 8-hour workday indicated in 29 CFR 1926.62
- E. Lead-Based Paint (LBP)
Paint or other surface coating that contains lead equal to or in excess of 1.0 milligrams per centimeter squared utilizing X-ray Fluorescence techniques or 0.5 percent lead by weight by laboratory techniques in accordance with EPA.
- F. Lead Exposure
Any condition that causes exposure to lead from lead-contaminated dust, lead-contaminated soil, lead-based paint that is deteriorated or present in accessible surfaces, friction surfaces, or impact surfaces that would result in adverse human health effects.

G. Lead Containing Paint (LCP)

Lead-based paint or other similar surfaces coating containing lead or lead compound which contain detectable levels of lead and are applicable to OSHA standard 29 CFR 1926.62.

H. Lead Control Area

A demarcated, enclosed area or structure constructed as a temporary containment equipped with HEPA filtered local exhaust, which prevents the spread of lead dust, paint chips, or debris existing as a condition of lead-based paint removal operations. The lead control area is also isolated by physical boundaries to prevent unauthorized entry of personnel.

I. Lead Permissible Exposure Limit (PEL)

Fifty micrograms per cubic meter of air as an 8-hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more than eight hours in a workday, the PEL shall be determined by the following formula: $PEL \text{ (micrograms/cubic meter of air)} = 400/\text{No. hours worked per day}$

J. Personal Sampling

Sampling of airborne lead concentrations within the breathing zone of an employee to determine the 8-hour time weighted average concentration in accordance with 29 CFR 1926.62. Samples shall be representative of the employees' work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and centered at the nose or mouth of an employee.

K. Physical Boundary

Area physically roped or partitioned off around an enclosed lead control area to limit unauthorized entry personnel. As used in this section "inside boundary" shall mean the same as "outside lead control area but inside boundary".

1.4 REQUIREMENTS

A. Description of Work

The work covered by this section includes abatement, handling and disposal of lead-based paint which is encountered during the repair, construction and demolition, and describes some of the resultant procedures and equipment required to protect workers and occupants of the building and area, or both, from exposure to lead. More specific operational procedures will be outlined in the Lead-based Paint Hazard Abatement called for elsewhere in this specification. The lead-based paint materials designated herein and on project drawing H1 shall be abated, transported and disposed in accordance with State and Federal regulations.

B. Contractor Responsibilities

Workers and the contracting firm performing component removal shall be trained and licensed accordance with OSHA 29 CFR 1926.62. Destructive activities to lead containing surfaces and personal protective equipment shall meet requirements of OSHA 29 CFR 1926.62. Personal Sampling in accordance with NIOSH and OSHA must be conducted for initial representative tasks, which disturb lead containing paint. The Contractor shall assume full responsibilities and liability for compliance with all applicable Federal, State, and local regulations pertaining to work practices, hauling, disposal, protection of workers, visitors to the site and persons occupying adjacent areas of the site. The Contractor shall hold the Owner and Owner's Representatives harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulation on their part, their employees or subcontractors.

C. Treatment of Lead-based Paint

1. Abate those lead-based paints noted herein and project drawing H1.
2. Test each of the representative lead-based paint waste streams maintained in DOT 55-gallon drums (paint chips, paint dust, paint debris, chemical removal waste, blasting media, lead contaminated expendables, and other lead-based paint accumulations) by the Toxicity Characteristic Leachate Procedure (TCLP) to determine if waste is hazardous.

1.5 SUBMITTALS

A. Submit the following in accordance with the Section regarding Submittal Procedures:

1. Personal Protective Equipment
2. Worker and Contractor EPA RRP Certifications
3. Lead-Based Paint/Lead-Containing Paint Removal Plan
4. Approved disposal facility for hazardous and non-hazardous lead disposal

B. Closeout Submittals

1. Completed and signed waste manifest from disposal facility
2. Analytical results for TCLP testing and waste determination

1.6 TESTING LABORATORY

Personal monitoring for representative tasks shall be performed by the contractor's testing laboratory. Submit the name, address, and telephone number of the testing laboratory selected to perform the air sampling, testing, and reporting of airborne concentrations of lead. Use a laboratory accredited under the EPA National Lead Laboratory Accreditation Program (NLLAP) or the American Industrial Hygiene Association (AIHA) and that is successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program to perform sample analysis.

1.7 LEAD-BASED PAINT (LBP) REMOVAL PLAN

Submit a detailed job-specific plan of the work procedures to be used in the removal or preparation of LBP. Detail the sequence of removal work and the coordination of activities with General Contractor. The plan shall include details of lead control areas, of decontamination procedures, collected debris disposal plan, air sampling plan, respirators, personal protective equipment, and description of the method of removal to ensure that airborne lead concentrations of 30 micrograms per cubic meter of air are not reached or exceeded outside of the lead control area. Include site preparation and cleanup procedures. Include occupational sampling, sampling methodology, frequency, duration of sampling, and qualifications of sampling personnel in the air sampling portion of the plan.

1.8 OCCUPATIONAL AND ENVIRONMENTAL ASSESSMENT DATA REPORT

Work must begin in a minimum of half-face respirator and protective clothing with an accessible decontamination unit. Upon receipt of personal exposure data, LBP/LCP removal work may not require full implementation of the requirements of 29 CFR 1926.62. Based on the exposure levels documented by the Contractor, the Contractor may be able to demonstrate that airborne exposures are controlled

below the action level.

1.9 QUALITY ASSURANCE

A. Medical Examinations

Initial medical surveillance as required by 29 CFR 1926.62 shall be made available to all employees exposed to lead at any time (1-day) above the action level. Full medical surveillance shall be made available to all employees on an annual basis who are or may be exposed to lead in excess of the action level for more than 30 days a year as required by 29 CFR 1926.62. Adequate records shall show that employees meet the medical surveillance requirements of 29 CFR 1926.33, 29 CFR 1926.62, and 29 CFR 1926.103.

B. Medical Records

Maintain complete and accurate records of employees' for a period of at least 30 years or for the duration of employment plus 30 years, whichever is longer.

C. Medical Surveillance

Provide medical surveillance to all personnel exposed to lead as indicated in 29 CFR 1926.62.

D. Competent Person Responsibilities (CP)

1. Certify training as meeting all federal, state, and local requirements.
2. Develop and approve the lead-based paint/lead-containing paint removal plan for conformance to applicable and referenced standards.
3. Inspect lead-based paint removal work for conformance with the approved plan.
4. Responsible for personnel air sampling.
5. Ensure work is performed in strict accordance with regulations and specifications at all times.
6. Control work to prevent exposure to tradesmen and the environment at all times.
7. Certify the conditions of the work as called for elsewhere in this specification.

E. Training

Train each employee performing paint removal, disposal, and air sampling operations prior to the time of initial job assignment and annually thereafter, in accordance with 40 CFR 745, 29 CFR 1926.21, and 29 CFR 1926.62.

F. Training Certification

Submit a certificate for each employee, signed and dated by the training source, stating that the employee has received the required lead training per 40 CFR 745, 29 CFR 1926.62 or 40 CFR 745.

E. Respiratory Protection Program

1. Furnish each employee required to wear a negative pressure respirator or other appropriate type with a respirator fit test at the time of initial fitting and at least annually thereafter as required by 29 CFR 1926.62.

2. Establish and implement a respiratory protection program as required 29 CFR 1910.134 and 29 CFR 1926.62.
- F. Hazard Communication Program
Establish and implement a Hazard Communication Program as required by 29 CFR 1926.59.
- G. Pre-Construction Conference
The CP shall meet with the Owners representative to discuss in detail the lead-based paint removal plan, including work procedures and precautions for the removal.
- H. Respirators
Furnish appropriate respirators approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services, for use in atmospheres containing lead dust. Respirators shall comply with the requirements of 29 CFR 1926.62.
- I. Protective Clothing
Furnish personnel who will be exposed to lead-contaminated dust with proper disposable (uncontaminated, reusable) protective whole body, head covering, gloves, and foot coverings as required by 29 CFR 1926.62. Furnish proper disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after obtaining approval from the CP.
- J. Vacuum Filters
UL 586 labeled HEPA filters.
- K. Title to Materials
Materials resulting from demolition work, except as specified otherwise, shall become the property of the Contractor and shall be disposed of as specified herein. Handling and disposal of hazardous waste shall be coordinated with the Owner to comply with existing Owner waste permits.

PART 2 PRODUCTS

2.1 Chemical Remover

A specifically formulated and manufactured product for the removal of lead-based paint shall be used for all required chemical stripping. Product training must be attended by the contractor's personnel prior to starting work. Removal of lead-based paint by chemical means provides moisture directly on the paint surface to prevent the spread of lead dust and the overlay cloth is removed with the lead-based paint adhered for clean collection and disposal. Ensure metal substrates are thoroughly rinsed to prevent tarnishing, rusting, corrosion or similar affects to metal surfaces. Explicitly follow manufacturer's direction.

2.2 Blasting Process

Blasting processes proposed for complete removal shall be described in the LBP Removal Plan and not present hazards in addition to lead-based paint include but not limited to silica content, generation of excessive water, or damage to substrates.

2.3 Testing

A test area shall be conducted by the contractor to include but not limited to application, cleaning, and paint compatibility. The contractor shall inform the Owner's representative of the result of the test area. The Owner's representative maintains the right to reject the product and process.

2.3 Application

Techniques selected shall not damage the substrate and be acceptable for scheduled new finishes.

2.4 Cleaning

The products shall be completely cleaned from the surface and work area upon completion.

PART 3 EXECUTION

3.1 PROTECTION

A. Notification

Notify the Owners representative 10 Days prior to the start of any lead-based paint abatement activities.

B. Lead Control Area Requirements

Establish a lead control area by situating critical barriers and physical boundaries around the area or structures where LBP removal operations will be performed.

C. Protection of Existing Work to Remain

Conduct abatement work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition or better. Polyethylene sheeting shall protect the soil surface for exterior removals and the flooring for interior removals. All porous surfaces and finishes not scheduled for paint removal shall be protected during paint removal methods.

D. Boundary Requirements

Provide physical boundaries around the lead control area by roping off the area designated in the work plan or providing curtains, portable partitions or other enclosures to ensure that airborne concentrations of lead will not reach 30 micrograms per cubic meter of air outside of the lead control area.

E. Physical Boundary

Provide physical boundaries around the lead control area by roping off the area designated in the work plan or providing curtains, portable partitions or other enclosures to ensure that airborne concentrations of lead will not reach 30 micrograms per cubic meter of air outside of the lead control area.

F. Warning Signs

Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.

G. Decontamination Shower Facility

A decontamination facility shall be required if personnel monitoring indicate airborne lead levels equal to or greater than 30 micrograms of lead per cubic meter of air. Provide clean and contaminated change rooms and shower facilities in accordance with this specification and 29 CFR 1926.62.

H. Personnel Protection

Personnel shall wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking or application of cosmetics is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been appropriately trained and provided with protective equipment.

3.2 WORK PROCEDURES

- A. Perform removal of lead-based paint to prevent lead containing dust or debris including but not limited to establishing a control zone with polyethylene barriers on work area entrances and coverings on the flooring or ground surface in the immediate area of removal. Requirements as described herein shall be addressed in the LBP removal plan. Use procedures and equipment required to limit occupational and environmental exposure to lead when lead-based paint is removed in accordance with 29 CFR 1926.62, except as specified herein. Dispose of removed paint chips and associated waste in compliance with Federal, State, and local requirements.

B. Personnel Exiting Procedures

Whenever personnel exit the lead-control area, they shall perform the following procedures and shall not leave the workplace wearing any clothing or equipment worn during the workday:

1. Vacuum themselves off.
2. Remove protective clothing in the designated changing area or decontamination unit, and place them in an approved impermeable disposal bag.
3. Shower (if decon required due to exposure assessment).
4. Change to clean clothes prior to leaving the physical boundary designated around the lead control area.

C. Air Sampling

Air sampling for the initial exposure/shift and additional daily sampling will be the responsibility of the contractor and designated CP. Air sample for lead in accordance with 29 CFR 1926.62 and as specified herein.

1. The CP or their designee shall be on the job site directing the air sampling and inspecting the lead-based paint removal work to ensure that the requirements of the contract have been satisfied during the entire lead-based paint removal operation.
2. Collect personal air samples on employees who are anticipated to have the greatest risk of exposure as determined by the CP. In addition, collect air samples on at least 25 percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.

D. Clearance

1. Composite soil samples or interior wipe samples as applicable, shall be collected in the area of abatement prior to and post project efforts by the CP to ensure total lead concentrations are at or below pre-work levels. Analysis for lead may be by Atomic Absorption Spectroscopy or Inductively Coupled Plasma.
2. Post abatement samples which are higher in concentrations of total lead than the pre-project samples shall require the Contractor to clean the area at no cost to the Owner.

E. Lead-Based Paint Removal

Manual dry sanding, power sanding, or hot work on lead-based paint or lead-containing surfaces is not permitted. Detail methodology for removal and surface preparation in the LBP work plan.

Take whatever precautions necessary to minimize damage to the underlying substrate.

F. Cleanup and Disposal

1. Cleanup

Maintain surfaces of the lead control area free of accumulations of paint chips and dust. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use compressed air to clean up the area. At the end of each shift and when the paint removal operation has been completed, clean the area of visible lead paint contamination by vacuuming with a HEPA filtered vacuum cleaner, wet mopping the area and wet wiping the area as indicated by the CP. Re-clean areas demonstrating dust or residual paint chips or debris. After visible dust, chips and debris is removed, wet wipe and HEPA vacuum all surfaces in the work area. If adjacent areas become contaminated at any time during the work, clean, visually inspect, and then wipe sample all contaminated areas. The CP shall ensure that the area has been cleaned of lead contamination to pre-project test levels before restarting work.

2. Disposal

- a. Lead-based paint waste and project related items (lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead contaminated clothing, which cannot be cleaned which may produce airborne concentrations of lead particles) shall be segregated by waste stream and stored in U.S Department of Transportation (49 CFR 178) approved 55-gallon drums. Properly label the drum to identify the type of waste (49 CFR 172) and the date the drum was filled. The Owners representative will assign an area for interim storage of waste-containing drums. Do not store waste in interim storage longer than 90 calendar days from the date affixed to each drum.
- b. Lead based paint waste in 55-gallon drums shall be tested by TCLP to determine if the waste is classified as hazardous or non-hazardous. TCLP results must be provided to the Owner or Owners representative prior to waste leaving the project site.
- c. Handle, store, transport, and dispose waste in accordance with 40 CFR 260, 49 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.
- d. All material, whether hazardous or non-hazardous shall be disposed in accordance with laws and provisions and federal, State, or local regulations.

G. Disposal Documentation

Submit written evidence that the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA and State or local regulatory agencies. Submit one copy of the completed manifest, signed and dated by the initial transporter in accordance with 40 CFR 262.

H. Hazardous Waste

Should hazardous waste be generated on this project, the waste shall not be removed from the site until analytical results are confirmed by the Owners representative. Payment for disposal of hazardous waste will not be made until a signed copy of the manifest from the treatment or disposal facility certifying the amount of waste is returned and a copy furnished to the Owner.

END OF SECTION

SECTION 028400 – REMOVAL AND DISPOSAL OF MERCURY AND PCB MATERIALS

PART 1 - GENERAL

1.1 SUMMARY

- A. Perform removal and disposal of non-PCB and PCB-containing ballasts, and mercury containing fluorescent and high-intensity bulbs. Additional details are available in the Hazardous Building Materials Assessment Report, Cape Lookout Lighthouse, Cape Lookout National Seashore, Harker's Island, North Carolina S&ME Project No. 22130469 dated November 10, 2022.
- B. The Contractor is responsible to provide all labor, materials, facilities, equipment, services, permits and agreements necessary to perform the work removal and disposal of non-PCB and PCB-containing ballasts, and mercury containing fluorescent and high-intensity bulbs in accordance with these specifications, and local, state and federal regulations.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. CODE OF FEDERAL REGULATIONS (CFR)

- | | |
|---------------|---|
| 1. 40 CFR 273 | Standards for Universal Waste |
| 2. 40 CFR 700 | TOSCA - General |
| 3. 40 CFR 761 | PCB Manufacturing, Processing, Distribution, and Use Prohibitions |
| 4. 40 CFR 260 | Hazardous Waste Management |
| 5. 40 CFR 261 | Identification and Listing of Hazardous Waste |
| 6. 40 CFR 262 | Generators of Hazardous Waste |
| 7. 40 CFR 263 | Transporters of Hazardous Waste |

1.3 REQUIREMENTS

- A. The work covered by this section includes removal, handling, and disposal or recycling of all PCB-containing and non-PCB ballasts, and mercury-containing fluorescent tubes and bulbs and high intensity lamps.
- B. The Contractor shall assume full responsibilities and liability for all applicable Federal, State, and local regulations pertaining to work practices, hauling, disposal, and worker protection.
- C. Treatment of ballasts and lighting
 - 1. Ballasts that do NOT display the term "NO PCBs" must be assumed to be PCB-containing and be removed and transported for treatment or disposal as Universal Waste in accordance with EPA and state of North Carolina requirements.
 - 2. Ballasts that display the label "No PCBs" shall be removed and transported for treatment or disposal in accordance with EPA and state of North Carolina requirements.

3. Mercury-containing fluorescent bulbs and lamps and high-intensity lamps shall be removed and transported for treatment or disposal as Universal Waste in accordance with EPA and state of North Carolina requirements.

1.4 SUBMITTALS

A. Submit the following in accordance with the Section regarding Submittal Procedures:

1. Personal Protective Equipment
2. Approved treatment or disposal facility for PCB-containing ballasts
3. Approved treatment or disposal facility for non-PCB containing ballasts
4. Approved treatment facility for mercury-containing bulbs and lamps

B. Closeout Submittals

1. Completed and signed waste manifest from treatment and disposal facility

PART 2 PRODUCTS

2.1 Storage and Transport Containers

Provide DOT approved 55-gallon drums or containers with removable secure lids for storage of lighting ballasts, bulbs, and lamps. A specifically formulated and manufactured product for the removal of lead-based paint shall be used for all required chemical stripping. Product training must be attended by the contractor's personnel prior to starting work. Removal of lead-based paint by chemical means provides moisture directly on the paint surface to prevent the spread of lead dust and the overlay cloth is removed with the lead-based paint adhered for clean collection and disposal. Ensure metal substrates are thoroughly rinsed to prevent tarnishing, rusting, corrosion or similar affects to metal surfaces. Explicitly follow manufacturer's direction.

2.2 Labelling

Provide caution labels and appropriate DOT shipping labels.

PART 3 EXECUTION

3.1 Work operations and processes shall comply with state, federal, and local requirements along with this specification section to include but not limited to the following.

A. Notification

Provide the source of recycling or disposal and notify the Owner representative 10 days prior to removal of waste.

B. Inspection and Reporting

Report leaks or spills of mercury or PCBs immediately to the Contracting Officer.

C. Cleanup

Cleanup of any such leaks or spills is the responsibility of the Contractor. Conduct work without damage or contamination of adjacent areas.

3.2 WORK PROCEDURES

A. Bulbs and Lamps

1. Bulbs shall be placed in drums to provide protection from breakage.
2. Apply a Universal Waste label. Fill and date.
3. Keep lid sealed when not loading and packing.
4. Store drums in a dry area approved by the Owner's Representative prior to transport for treatment or disposal.

B. PCB Ballasts

1. Ballasts NOT labelled with the statement "No PCBS" shall be placed in DOT approved 55-gallon drums.
2. Apply a Universal Waste label. Fill and date.
3. Keep lid sealed when not loading and packing.
4. Store drums in a dry area approved by the Owner's Representative prior to transport for treatment or disposal.

C. Non-PCB Ballasts

1. Ballast labeled "No PCBs" shall be stored in a DOT approved or corrugated drum separate from those ballasts NOT labelled "No PCBS".
2. Keep lid sealed when not loading and packing.
3. Store drums in a dry area approved by the Owner's Representative prior to treatment or disposal in accordance with EPA and state of North Carolina requirements.

3.3 DISPOSAL

A. Notification

Inspect all waste containers and notify the Owner's Representative 10 days prior to transport for treatment or disposal.

B. Certification

Confirm the treatment and disposal destinations and the acceptance of the waste in accordance with EPA and state of North Carolina. Submit proof of waste acceptance and manifests to the Owner's Representative.

END OF SECTION

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cast-in-place concrete.
 - 2. Formwork.
 - 3. Fiberglass reinforcing.
 - 4. Concrete materials.
 - 5. Mixture design.
 - 6. Placement procedures.
 - 7. Finishes.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, and other pozzolans materials subject to compliance with requirements.
- B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.3 DISPOSAL REQUIREMENTS AND WASHOUT LIMITATIONS

- A. See Division 1 Section 015723 "Temporary Storm Water Pollution Prevent" and Section 017419 "Construction Waste Management and Disposal" for washout limitations and disposal requirements.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Not required.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture, include the following:
 - 1. Mixture identification.
 - 2. Minimum 28-day compressive strength.
 - 3. Durability exposure class.
 - 4. Maximum w/cm.
 - 5. Calculated equilibrium unit weight, for lightweight concrete.
 - 6. Slump limit.
 - 7. Air content.

8. Nominal maximum aggregate size.
 9. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
 10. Intended placement method.
 11. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 12. Submit written report to Contracting Officer for each proposed concrete mix at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed and are acceptable to Contracting Officer.
- C. Shop Drawings: Comply with ACI SP-066:
1. Include placing drawings that detail fabrication, bending, and placement.
 2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Construction Joint Layout: Indicate proposed construction joints required to build the structure.
1. Location of construction joints is subject to approval of the Contracting Officer.
- E. Qualification Data: For installer, manufacturer, and testing agency.

1.6 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each of the following, signed by manufacturers:
1. Cementitious materials.
 2. Admixtures.
 3. Curing compounds.
 4. Form materials and form-release agents.
 5. Fiberglass reinforcement and accessories.
- B. Material Test Reports: For the following, from a qualified testing agency:
1. Portland cement.
 2. Fly ash.
 3. Slag cement.
 4. Blended hydraulic cement.
 5. Aggregates.
 6. Admixtures.
 7. Fiberglass Reinforcement.
- C. Preconstruction Test Reports: For each mix design.
- D. Field quality-control reports.

1.7 QUALITY ASSURANCE

- 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. Materials and installed work may require testing and retesting at any time during progress of Work. Tests, including retesting of rejected materials for installed Work, shall be done at Contractor's expense.
- C. Quality Control:
 - 1. The testing laboratory will perform sampling and testing during concrete placement, as directed by the Contracting Officer. This testing does not relieve Contractor of responsibility of providing concrete in compliance with specifications. Contractor may perform additional testing as necessary, at no expense to Owner, to ensure quality of concrete.
 - 2. Materials and installed work may require testing and retesting at any time during progress of Work. Tests, including retesting of rejected materials for installed Work, shall be done at Contractor's expense.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.
 - 1. Include the following information in each test report:
 - a. Admixture dosage rates, if admixtures are used.
 - b. Slump.
 - c. Air content.
 - d. Seven-day compressive strength.
 - e. 28-day compressive strength.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301 (ACI 301M).

1.10 FIELD CONDITIONS

- A. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1.
- B. Cold-Weather Placement: Comply with ACI 306.1.
 - 1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

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, "Specification for Structural Concrete".
 - 2. ACI 117, "Specification for Tolerances for Concrete Construction and Materials".

3. ACI 315, "Details and Detailing of Concrete Reinforcement".

2.2 FORM-FACING MATERIALS

- A. 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.

2.3 FIBERGLASS REINFORCEMENT

- A. Reinforcing Bars: ACI 440.6-08
- B. All rebar must be sand-coated, not smooth, in addition to having deformations.

2.4 CONCRETE MATERIALS

- A. Cementitious Materials:
 1. Portland Cement: ASTM C150/C150M, Type I.
 2. Fly Ash: ASTM C618, Class C or F.
- B. Normal-Weight Aggregates: ASTM C33/C33M, coarse 3/8 inch crushed aggregate or smaller, graded. Provide aggregates from a single source.
- C. Air-Entraining Admixture: ASTM C260/C260M.
- D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures 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 C494/C494M, Type A.
 2. Retarding Admixture: ASTM C494/C494M, Type B.
 3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
 5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
- E. Water: ASTM C94/C94M, potable.

2.5 VAPOR RETARDERS – (Not Used)

2.6 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 C171, polyethylene film burlap-polyethylene sheet.
 1. Color:

- a. Ambient Temperature Below 50 deg F (10 deg C): Black.
 - b. Ambient Temperature between 50 deg F (10 deg C) and 85 deg F (29 deg C): Any color.
 - c. Ambient Temperature Above 85 deg F (29 deg C): White.
- C. Curing Paper: Eight feet wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.
- F. Clear, Waterborne, Membrane-Forming, Nondissipating Curing Compound: ASTM C309, Type 1, Class B, certified by curing compound manufacturer to not interfere with bonding of floor covering.
- G. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

2.7 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.
 - 1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use all-plastic bar supports.
- B. Steel Tie Wire: Do not use. Use plastic ties with fiberglass rebar.

2.8 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, in accordance with ACI 301.
 - 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
 - 1. Fly Ash or Other Pozzolans: 25 percent by mass.
- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
 - 1. Use water-reducing, 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 and concrete with a w/cm below 0.50.

- D. Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Contracting Officer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Contracting Officer before using in Work.
- E. Submit written reports to Contracting Officer of each proposed mix for each class of concrete at least 15 days prior to start of Work. Do not begin concrete production until proposed mix designs have been reviewed by Contracting Officer.

2.9 CONCRETE MIXTURES

- A. Normal-Weight Concrete:
 - 1. Minimum Compressive Strength: 4000 psi at 28 days.
 - 2. Maximum W/C Ratio: 0.45.
 - 3. Slump Limit: 4 to 5 inches (100 mm), prior to addition of any plasticizing admixtures, 9 inches after addition of admixture.
 - 4. Air Content: 5% percent, $\pm 1.5\%$.

2.10 CONCRETE MIXING

- A. 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.
 - 4. Mixing at the Project site does not relieve the Contractor of sampling and testing requirements.

2.11 FABRICATING REINFORCEMENT

- A. Fabricate fiberglass reinforcement according to ACI 440.1R-15.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. General: 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. Fabricate 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 before and during concrete placement. 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.

3.2 INSTALLATION OF EMBEDDED ITEMS

- 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.
 - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
 - 3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.3 INSTALLATION OF REINFORCEMENT

- A. Comply with ACI 440.1R-15 for placing and supporting reinforcement.

- B. Clean reinforcement of all foreign materials that reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement.
 - 1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
- D. Preserve clearance between bars of not less than 1 inch (25 mm), not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
- E. Provide concrete coverage in accordance with ACI 318 (ACI 318M).
- F. Set ties with ends directed into concrete, not toward exposed concrete surfaces.
- G. Splices: Lap splices as indicated on Drawings.
 - 1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, or 24 inches (610 mm), whichever is greater.
 - 2. Stagger splices in accordance with ACI 318 (ACI 318M).

3.4 JOINTS

- A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Contracting Officer.
 - 1. Place joints perpendicular to main reinforcement.
 - 2. Continue reinforcement across construction joints unless otherwise indicated.
 - 3. Do not continue reinforcement through sides of strip placements of floors and slabs.

3.5 INSTALLATION TOLERANCES

- A. Comply with ACI 117 (ACI 117M).

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
- B. Notify Contracting Officer and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Contracting Officer in writing.
- 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.
 - 1. If a section cannot be placed continuously, provide construction joints as indicated.
 - 2. Deposit concrete to avoid segregation.
 - 3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.

- a. Do not use vibrators to transport concrete inside forms.
 - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
 - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
 - d. 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. Hot-Weather Placement: Comply with ACI 301 and as follows:
 - 1. Maintain concrete temperature below 90 deg F (32 deg C) 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 and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
- F. 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 (4.4 deg C) 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.

3.7 FINISHING FLOORS AND SLABS

- A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Broom Finish: Apply a broom finish to exterior concrete deck and locations indicated on Drawings.
 - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
 - 2. Coordinate required final finish with Contracting Officer before application.
- C. Slip-Resistive Finish: Before final floating, apply slip-resistive finish to exterior concrete deck.
 - 1. Apply in accordance with manufacturer's written instructions and as follows:
 - a. Uniformly spread **25 lb/100 sq. ft.** of dampened slip-resistive aggregate or aluminum granules over surface in one or two applications.
 - b. Tamp aggregate flush with surface, but do not force below surface.
 - c. After broadcasting and tamping, apply float finish.

- d. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate or aluminum granules.

3.8 CONCRETE CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
 - 1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
 - 2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
 - 3. Maintain moisture loss no more than 0.2 lb./sq. ft. x h before and during finishing operations.
- B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:
 - 1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
 - 2. If forms remain during curing period, moist cure after loosening forms.
 - 3. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
 - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
 - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
 - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
- C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:
 - 1. Begin curing immediately after finishing concrete.
 - a. Floors to Receive Curing Compound:
 - 1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
 - 3) Maintain continuity of coating, and repair damage during curing period.
 - 4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
 - b. Floors to Receive Curing and Sealing Compound:
 - 1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
 - 3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.9 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Contracting Officer. Remove and replace concrete that cannot be repaired and patched to Contracting Officer's approval.

3.10 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.
- B. Testing Agency: Contractor will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
 - 1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
 - 2. Testing agency shall immediately report to Contracting Officer, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
 - 3. Testing agency shall report results of tests and inspections, in writing, to Contracting Officer, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
 - a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
 - 1) Project name.
 - 2) Name of testing agency.
 - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
 - 4) Name of concrete manufacturer.
 - 5) Date and time of inspection, sampling, and field testing.
 - 6) Date and time of concrete placement.
 - 7) Location in Work of concrete represented by samples.
 - 8) Date and time sample was obtained.
 - 9) Truck and batch ticket numbers.
 - 10) Design compressive strength at 28 days.
 - 11) Concrete mixture designation, proportions, and materials.
 - 12) Field test results.
 - 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
 - 14) Type of fracture and compressive break strengths at seven days and 28 days.
- C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.
- D. Inspections:

1. Headed bolts and studs.
 2. Verification of use of required design mixture.
 3. Concrete placement, including conveying and depositing.
 4. Curing procedures and maintenance of curing temperature.
 5. Verification of concrete strength before removal of shores and forms from beams and slabs.
 6. Reinforcement placement.
- E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with 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.
 - 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.
 2. Slump: ASTM C143/C143M:
 - a. 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.
 - b. Perform additional tests when concrete consistency appears to change.
 3. Slump Flow: ASTM C1611/C1611M:
 - a. 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.
 - b. Perform additional tests when concrete consistency appears to change.
 4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete.
 - a. 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 C1064/C1064M:
 - a. 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 C567/C567M fresh unit weight of structural lightweight concrete.
 - a. 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 C31/C31M:
 - a. Cast and laboratory cure two sets of two cylinder specimens for each composite sample.
 - b. Cast, initial cure, and field cure two sets of two standard cylinder specimens for each composite sample.
 8. Compressive-Strength Tests: ASTM C39/C39M.
 - a. Test one set of two field-cured specimens at seven 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 Contracting Officer, concrete manufacturer, and Contractor within 24 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 Contracting Officer but will not be used as sole basis for approval or rejection of concrete.
13. Additional Tests:
 - a. 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 Contracting Officer.
 - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Contracting Officer.
 - 1) Acceptance criteria for concrete strength shall be in accordance with ACI 301, section 1.6.6.3.
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.

3.11 MATERIAL STORAGE

- A. Store materials to permit easy access for inspection and identification. Keep reinforcing off the ground, using pallets, platforms, or other supports. Protect reinforcing and packaged materials from erosion and deterioration.

END OF SECTION 033000

SECTION 040322 - HISTORIC BRICK UNIT MASONRY REPAIR

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes historic treatment work consisting of rebuilding and repairing historic clay brick masonry, and the material and procedures for installation of cementitious injected grout anchors.
- B. Related Requirements:
 - 1. Section 013591 "Historic Treatment Procedures" for general historic treatment requirements.
 - 2. Section 024296 "Historic Removal and Dismantling" for historic removal and dismantling work.
 - 3. Section 040323 "Historic Brick Unit Masonry Repointing" for repointing.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM), 100 Barr Drive, West Coshohocken, PA, 19428, (620) 832-9585 or FAX (610) 832-9555.

1.3 DEFINITIONS

- A. Low-Pressure Spray:
 - 1. Pressure: 100 to 400 (690 to 2750) psi (kPa).
 - 2. Flow Rate: 4 to 6 (0.25 to 0.4) gpm (L/s).
- B. Rebuilding (Bedding) Mortar: Mortar used to set and anchor masonry in a structure, distinct from pointing mortar installed after masonry is set in place.

1.4 DISPOSAL REQUIREMENTS AND WASHOUT LIMITATIONS

- A. See Division 1 Section 015723 "Temporary Storm Water Pollution Prevent" and Section 017419 "Construction Waste Management and Disposal" for washout limitations and disposal requirements.

1.5 PROJECT CONDITIONS:

- A. Protection of Site: Protect Project Site elements and finishes from damage and from deterioration caused by work of this Section. Repair damage to materials and damage to finishes to Contracting Officer's satisfaction at no additional cost.

1. Exclusion of Water: Cover open joints and areas from which units have been removed during periods when work is suspended to ensure materials and finishes are not damaged by water penetration.
 2. Prevention of Staining: Prevent mortar from staining exposed building surfaces.
- B. Contract Drawings: The Drawings are two-dimensional representations of three-dimensional objects and do not show all surfaces. Perform work on all surfaces of projections, reveals, returns, and other elements and surfaces associated with areas on which work is indicated.

1.6 ENVIRONMENTAL CONDITIONS, GENERAL

- A. Do not proceed with brick work under adverse weather conditions, or when temperatures are below or above Manufacturer's recommended limitations for installation or specified herein. In case of conflict, the most restrictive requirements shall govern. Proceed with the work only when forecasted weather conditions are favorable for proper cure.
- B. Wet Weather: Do not apply or mix mortar on outside surfaces with standing water or outside during rain.
- C. Cold Weather construction is not allowed, when surface temperature of masonry is below 40 deg F or air temperature is predicted to be below 40 deg F for a period of five days.
- D. Damage Caused by Freezing: Remove brick masonry restoration work determined by Contracting Officer to have been damaged by freezing conditions. Replace work to comply with requirements of this Section.
- E. Hot Weather: The surface temperature of the work, not the ambient temperature, shall not be higher than 80 deg F. Mortar mixing shall be done only in the shade. Pointing work shall be done in the shade. Work around the building during the day so that the fresh work will be shielded from direct sunlight to reduce evaporation rate.
- F. Protect fresh mortar from premature drying when temperature, humidity, and wind conditions result in rapid drying of mortar. See Curing Requirements in this Section.

1.7 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.
- C. Cementitious Injected Grout Anchors: Submit shop drawings, material certificates and test reports as required to prove the installation meets the requirements of the Section.

1.8 INFORMATIONAL SUBMITTALS

- A. Preconstruction test reports.

1.9 QUALITY ASSURANCE

- A. Masonry Firm Qualifications: A qualified historic brick masonry repair specialist. Experience installing standard unit masonry is insufficient experience for masonry historic treatment work.
1. Award historic brick masonry repair work to firm regularly engaged in in the preparation of mortars to match historic mortars and the repair of historic masonry, similar in nature, materials, design, and extent to the work in this Section, and that can demonstrate to Owner's satisfaction that, within previous five years, the firm has successfully performed and completed in a timely manner at least three projects similar in scope and type to work required on this Project involving buildings designated as Landmarks by local governmental authorities, buildings listed in the National Register of Historic Places, or buildings listed in a State Register of Historic Places under the direction of preservation authorities.
 2. Additional personnel must also have the following experience:
 - a. Project Manager Qualifications: An experienced project manager, regularly engaged as a project manager on historic preservation projects similar in nature, materials, design, and extent to the work as specified in this section, and that can demonstrate to Owner's satisfaction that, within the previous five years, they have acted as a project manager on at least five projects, similar in scope and type to the work required by this section.
 - a. Trades Person/Craftsman/Laborer/Worker Qualification: Experienced persons, regularly engaged in historic preservation work similar in nature, material, design, and extent to the work as specified in this section, and that can demonstrate to Owner's satisfaction that, within the previous five years, they have worked on at least five projects, similar in scope and type to the work required by this section.
 - 1) Masonry work shall be carried out by a steady crew of skilled masons who are thoroughly experienced with materials and methods specified.
- B. Mockups: Prepare mockups of historic treatment to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation.
1. Use crew that will execute the work and follow the requirements of this Section.
 2. Allow mockups with mortar to dry for seven days to allow potential problems to appear. Notify Contracting Officer when mock-up is ready for review.
 3. Repeat mockups as necessary to obtain Contracting Officer's approval.
 4. Protect approved mock-ups to ensure that they are without damage, deterioration, or alteration at time of Substantial Completion.
 5. Approved mockups in undamaged condition at time of Substantial Completion may be incorporated into the Work.
 6. Approved mockups will represent minimum standards for work in this section. Subsequent brick masonry work that does not meet standards of approved mockups will be rejected.
 7. Retain approved mockups in undisturbed condition, suitably identified, during work as a standard for evaluating completed work.
- C. Required Mockups:

1. Masonry Repair: Prepare sample areas for each type of masonry material indicated to have repair or rebuild work performed. Construct sample areas in locations where directed by Contracting Officer unless otherwise indicated. Demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:
 - a. Reconstruction: One location, 24 inches high by 24 inches wide, by the full thickness of the wall (approximately 19 inches), including the installation of fiberglass reinforcement and masonry joint reinforcement.

1.10 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on brick masonry as follows:
 1. Replacement Brick: Test each proposed type of replacement brick, according to sampling and testing methods in ASTM C67 for compressive strength and initial rate of absorption (suction).
 2. Salvage Brick: Test salvage brick, according to sampling and testing methods in ASTM C67 for compressive strength and initial rate of absorption (suction).

PART 2 - PRODUCTS

2.1 MASONRY MATERIALS

- A. Salvaged Brick: Approved by the Contracting Officer. Sound, crack free, clean brick, without face chips larger than 1/2 inch, salvaged from removal of the existing brick work of the same type. Reuse bricks in same use (face vs. interior) as existing.
 1. During disassembly, bricks shall be sorted and conditions of bricks checked.
 2. Damaged bricks shall not be used during the rebuild.
 3. Damaged whole bricks from areas of Flemish bond can be cut and reused as bats, infill, and as queen closers in the reconstruction of areas of Flemish bond.
 4. Salvage as much existing brick as possible.
- B. Replacement Brick: Units, including molded, ground, cut, or sawed shapes as required to complete masonry repair work.
 1. Brick Matching Existing: Units with colors, color variation within units, surface texture, size, and shape that match existing brickwork.
 - a. Physical Properties: According to ASTM C67 and as follows:
 - 1) Compressive Strength: between 2,000 and 4,000 psi.
 - 2) Initial Rate of Absorption: between 10 and 30 grams of water absorbed in one minute over 30 square inches of brick bed area.

- b. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.
- c. For Contracting Officer's sample that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range rather than brick that matches an individual color within that range.

2.2 MORTAR MATERIALS – ROD VOID AT WATCH LEVEL

- A. Portland Cement: ASTM C150/C150M, Type I; white.
 - 1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C114.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Mortar Sand: ASTM C144 unless otherwise indicated.
 - 1. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
- D. Water: ASTM C270, potable.

2.3 MORTAR MATERIALS - BEDDING

- A. Natural Cement:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
 - 2. Century Brand Natural Cement by Freedom Cement.
 - a. Manufacturer: Freedom Cement.
 - 1) (866) 254-7277.
 - 3. Or Approved Equal.
 - a. Brand Name or Equal Salient Characteristics that an equal must meet are delineated below:
 - b. Physical: Matching the characteristics of the existing mortar, confirmed by testing by a historic mortar testing professional approved by the Engineer of Record, and submitted through the Contracting Officer.
 - c. Functional: None.
 - d. Performance: ASTM C10 Standard Specification for Natural Cement.
- B. Mortar Sand: ASTM C144 unless otherwise indicated.
 - 1. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
- C. Water: ASTM C270, potable.

2.4 REINFORCEMENT

- A. Fiberglass Reinforcement: Reinforcing Bars: ACI 440.6-08
 - 1. All rebar must be sand-coated, not smooth, in addition to having deformations.
- B. Masonry-Joint Reinforcement, General: ASTM A951/A951M.
 - 1. Exterior Walls: Stainless steel.
 - 2. Wire Size for Side Rods: 0.148-inch (3.77-mm) diameter.
 - 3. Wire Size for Cross Rods: 0.148-inch (3.77-mm) diameter.
 - 4. Spacing of Joint Reinforcing, Cross Rods, Tabs, and Cross Ties: Every 3 courses vertical spacing.
 - 5. Provide to match curvature of masonry wall being reconstructed.

2.5 CEMENTITIOUS INJECTIONS GROUT ANCHORS

- A. All anchors and grout mix shall be supplied by a firm with a minimum of ten (10) years' experience in the supply and technical support of cementitious grout anchors of the type proposed.
- B. All anchor assemblies shall be supplied with a fabric grout retainer to prevent flow of grout into voids and openings in the anchor hole. The mesh of the textile shall be of such a size to retain the mass of the grout while allowing the grout milk to penetrate in order to achieve adhesion of the grout on the substrate surface. The textile sock shall have sufficient expansion capability to allow the sock to conform to voids and cracks in the substrate in order to obtain mechanical interlocking, plus adhesion.
- C. Types of anchors:
 - 1. Horizontal anchors as shown on Drawings at temporary roof system.
 - 2. Vertical tension tie rods as shown on Drawings, penetrating approximately 12 feet down into the cone of the masonry of the lighthouse and extending upward approximately 9 feet above the Watch Level landing to the Lantern Level.
- D. Anchor length shall be determined in the field by the Contractor before placing final order.
- E. Grout mix for anchors shall be a mineral based non-shrink grout with a minimum 28 day compressive strength of 5,500 psi.

2.6 MORTAR MIXES

- A. 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.
- B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Contracting Officer's approval.
 - 1. Mortar Pigments: Where mortar pigments are indicated, do not add pigment exceeding 10 percent by weight of the cementitious or binder materials, except for carbon black which

is limited to 2 percent, unless otherwise demonstrated by a satisfactory history of performance.

- C. Do not use admixtures in mortar unless otherwise indicated.
- D. Mixes: Mix mortar materials in the following proportions:
 - 1. Mortar for Void around Rods by Volume: ASTM C270, Type M Proportion Specification, 3 parts Type I white Portland cement, 1 part Type S hydrated lime, and 9 to 12 parts sand.
 - 2. Rebuilding (Bedding) Mortar: Natural Cement mortar, 1 part cement, and 1.6 part sand, and enough water to form a workable consistency.

PART 3 - EXECUTION

3.1 GENERAL

- A. Wetting and Soaking Bricks and Existing Masonry: Thoroughly drench brick and existing masonry with water 24 hours prior to installation. Thoroughly rewet brick and existing masonry immediately before installation of brickwork to ensure that brick and masonry are nearly saturated but free of surface water (saturated, surface dry) when mortar is applied. Wet both replacement and surrounding bricks that have ASTM C67 initial rates of absorption of more than 30 g/30sq. in per min. Salvaged brick shall be soaked for a minimum of 24 hours before use in work. New replacement brick shall be soaked for a minimum of 7 days before use in the work or longer as determined by the Engineer of Record based on the length change results from the materials testing.

3.2 PROTECTION

- A. Prevent mortar from staining face of surrounding masonry and other surfaces.

3.3 MASONRY REPAIR, GENERAL

- A. Have repair work performed only by qualified historic treatment specialist.

3.4 BRICK REMOVAL AND REPLACEMENT

- A. Any locations where bricks exhibit damage, spalling or deterioration, remove bricks that are damaged, spalled, or deteriorated or are to be reused. Carefully 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.
- C. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.

- D. Notify the Contracting Officer of unforeseen detrimental conditions, including voids, cracks, bulges, loose masonry units in existing backup, rotted wood, rusted metal, and other deteriorated items.
- E. Remove in an undamaged condition as many whole bricks as possible. Remove mortar and sealant from surfaces of removed units.
- F. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for brick replacement.
- G. Replace removed damaged brick with other removed brick in good condition, where possible, matching existing brick. Do not use broken units unless they can be cut to usable size.
- H. Install replacement brick into bonding and coursing pattern indicated on Drawings. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
 - 1. Maintain joint width for replacement units to match existing joints.
 - 2. Use setting buttons or shims to set units accurately spaced with uniform joints.
- I. Lay replacement brick with rebuilding (bedding) mortar and 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 bricks that have ASTM C67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. (30 g/194 sq. cm per min.). 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 existing brickwork on the interior face of the structure below.

3.5 CURING

- A. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
 - 1. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.
- B. Protect completed work from adverse weather, heavy rainfall, freezing, and drying by direct sunlight and winds until cured.
- C. The method of curing selected shall consider the physical characteristics of the structure, as well as, the previously mentioned conditions. Protect fresh mortar from premature drying when temperature, humidity, and wind conditions may result in rapid drying. Provide and maintain tarps against wind and direct sun. Protect masonry for a minimum of 72 hours after application by one of the following procedures:
 - 1. Water-Soaked Cover: Provide and maintain burlap or other damp cloths over masonry to protect mortars from pre-mature drying. Install, maintain, and remove coverings using methods that do not damage or alter masonry.
 - 2. Fog Spray: Apply a fine fog spray of water to newly constructed masonry as frequently as required, to maintain moist curing environment. Care must be taken to avoid erosion

damage of the surface. Use water free of iron and of all other contaminants that might adversely affect masonry. Do not use water stream or pressure that might wash binder from surface of mortar or cause runoff on masonry.

3.6 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
 - 1. Space reinforcement Every 3 courses vertical spacing.

3.7 CEMENTITIOUS INJECTION GROUT ANCHORS

- A. Grout anchors shall be inserted in accordance with the Manufacturer's written instructions and the project details, such work must be carried out by an installer approved and certified by the Manufacturer.

3.8 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, applied by low-pressure spray.
 - 1. Do not use metal scrapers or brushes.
 - 2. Do not use acidic or alkaline cleaners.

END OF SECTION 040322

SECTION 040323 - HISTORIC BRICK UNIT MASONRY REPOINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes historic treatment work consisting of repointing brick masonry joints.
- B. Related Requirements:
 - 1. Section 013591 "Historic Treatment Procedures" for general historic treatment requirements.
 - 2. Section 024296 "Historic Removal and Dismantling" for historic removal and dismantling work.
 - 3. Section 040322 "Historic Brick Unit Masonry Repair" for historic treatment work consisting of rebuilding and repairing historic clay brick masonry.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM), 100 Barr Drive, West Coshohocken, PA, 19428, (620) 832-9585 or FAX (610) 832-9555.

1.3 DEFINITIONS

- A. Low-Pressure Spray:
 - 1. Pressure: 100 to 400 (690 to 2750) psi (kPa).
 - 2. Flow Rate: 4 to 6 (0.25 to 0.4) gpm (L/s).

1.4 DISPOSAL REQUIREMENTS AND WASHOUT LIMITATIONS

- A. See Division 1 Section 015723 "Temporary Storm Water Pollution Prevent" and Section 017419 "Construction Waste Management and Disposal" for washout limitations and disposal requirements.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

1.6 PROJECT CONDITIONS

- A. Do not install products or materials that are wet, moisture damaged, mold damaged or contaminated.

- B. Protection of Site: Protect Project Site elements and finishes from damage and from deterioration caused by work of this Section. Repair all materials and finishes damaged as a result of work of this Section to Contracting Officer's satisfaction at no additional cost to Owner.

1.7 ENVIRONMENTAL CONDITIONS

- A. General: Perform work only when temperature of products being used and air temperature and humidity comply with Manufacturer's requirements and requirements of this Section. In case of conflict, the most stringent requirements shall govern.
 - 1. Do not proceed with installation under adverse weather conditions, or when temperatures are below or above limitations for installation; proceed with the work only when existing and forecasted weather conditions are favorable for proper cure. Do not apply or mix mortar on outside surfaces with standing water or outside during rain.
- B. Cold Weather Limitations on Use of Mortars: Do not mix or use mortars when air or surface temperature of masonry is below 40 deg F or when it is expected to drop below 40 deg F within 72 hours of mortar application.
- C. Hot Weather Requirements: Protect fresh mortar from rapid drying when temperature, humidity, and wind conditions might cause rapid drying of mortar.

1.8 QUALITY ASSURANCE

- A. Masonry Firm Qualifications: A qualified historic masonry repointing specialist. Experience in pointing or repointing only new or nonhistoric masonry is insufficient experience for masonry historic treatment work.
 - 1. Award historic brick masonry repointing work to firm regularly engaged in in the preparation of mortars to match historic mortars and the repair of historic masonry, similar in nature, materials, design, and extent to the work in this Section, and that can demonstrate to Owner's satisfaction that, within previous five years, the firm has successfully performed and completed in a timely manner at least three projects similar in scope and type to work required on this Project involving buildings designated as Landmarks by local governmental authorities, buildings listed in the National Register of Historic Places, or buildings listed in a State Register of Historic Places under the direction of preservation authorities.
 - 2. Additional personnel must also have the following experience:
 - a. Project Manager Qualifications: An experienced project manager, regularly engaged as a project manager on historic preservation projects similar in nature, materials, design, and extent to the work as specified in this section, and that can demonstrate to Owner's satisfaction that, within the previous five years, they have acted as a project manager on at least five projects, similar in scope and type to the work required by this section.

- a. Trades Person/Craftsman/Laborer/Worker Qualification: Experienced persons, regularly engaged in historic preservation work similar in nature, material, design, and extent to the work as specified in this section, and that can demonstrate to Owner's satisfaction that, within the previous five years, they have worked on at least five projects, similar in scope and type to the work required by this section.
 - 1) Masonry work shall be carried out by a steady crew of skilled masons who are thoroughly experienced with materials and methods specified.
- B. Mockups: Prepare mockups of historic treatment on existing surfaces to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Repointing: Rake out joints in one separate area, approximately 36 inches (900 mm) high by 48 inches (1200 mm) wide for each type of repointing required.

PART 2 - PRODUCTS

2.1 MORTAR MATERIALS

- A. Natural Cement:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
 - 2. Century Brand Natural Cement by Freedom Cement.
 - a. Manufacturer: Freedom Cement.
 - 1) (866) 254-7277.
 - 3. Or Approved Equal.
 - a. Brand Name or Equal Salient Characteristics that an equal must meet are delineated below:
 - b. Physical: Matching the characteristics of the existing mortar, confirmed by testing by a historic mortar testing professional approved by the Engineer of Record, and submitted through the Contracting Officer.
 - c. Functional: None.
 - d. Performance: ASTM C10 Standard Specification for Natural Cement.
- B. Mortar Sand: ASTM C144 unless otherwise indicated.
 - 1. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
 - 2. Color: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.
 - 3. Provide sand with rounded edges.
- C. Water: ASTM C270, potable.

2.2 MORTAR MIXES

- A. 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.
- B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Contracting Officer's approval.
- C. Do not use admixtures in mortar unless otherwise indicated.
- D. Mixes: Mix mortar materials in the following proportions:
 - 1. Rebuilding (Bedding) Mortar: Natural Cement mortar, 1 part cement, and 1 part sand, and enough water to form a workable consistency.
 - 2. Pointing Mortar: Natural Cement mortar, 1 part cement, and 1.6 part sand, and enough water to form a workable consistency.

PART 3 - EXECUTION

3.1 PROTECTION

- A. Prevent mortar from staining face of surrounding masonry and other surfaces.

3.2 MASONRY REPOINTING, GENERAL

- A. Have repointing work performed only by qualified historic treatment specialist.

3.3 POINTING

- A. 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(es) until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
 - 3. After deep areas have been filled to same depth as remaining joints, point joints by placing mortar in layers not greater than 3/8 inch(es). Fully compact each layer and allow

it to become thumbprint hard before applying next layer. Where existing brick 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. 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.
 - a. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
 - b. Adjust curing methods to ensure that pointing mortar is damp throughout its depth without eroding surface mortar.
6. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Remove mortar and repoint.

- B. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.

3.4 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, applied by low-pressure spray.
 1. Do not use metal scrapers or brushes.
 2. Do not use acidic or alkaline cleaners.

END OF SECTION 040323

SECTION 050374 - HISTORIC DECORATIVE METAL REPLICATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Historic treatment of decorative metal in the form of replicating and installing historic items and whole assemblies.

B. Related Requirements:

1. Section 013591 "Historic Treatment Procedures" for general historic treatment requirements.
2. Section 050383 "Historic Cast Iron Repair" for repairing historic cast iron.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference in conjunction with the regularly scheduled progress meetings during construction, at Project site.

1. Review minutes of Preliminary Historic Treatment Conference that pertain to historic treatment of decorative metal and fire protection.
2. Review methods and procedures related to historic treatment of decorative metal.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, and sections showing locations and details of each new metal item and component and its location on the structure in annotated plans and elevations.

C. Samples: For each exposed product and for each color and texture specified.

1. Not Required.

D. Metallurgical Tests: Contractor responsibility for testing to determine weldability at locations where existing metal or cast iron will be welded to new metal or cast iron.

1.4 QUALITY ASSURANCE

A. Historic Treatment Specialist Qualifications: A qualified historic decorative metal fabrication and installation specialist. Repair specialist shall be experienced in wrought iron and cast iron

work. Experience installing and finishing new decorative metalwork is insufficient experience for decorative metal historic treatment work.

- B. Mockups: Prepare mockups of historic treatment replication and installation processes to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation. Prepare mockups so they are inconspicuous.
 - 1. Replacing Wrought Iron Component: One wrought-iron mockup of any wrought iron element being replaced.
 - 2. Cast-Metal Components: Submit patterns, models, or plaster castings made from existing cast-iron item for each replacement casting required.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

- A. General: Provide decorative metal materials made of the alloys, forms, and types that match existing metals and have the ability to receive finishes matching existing finishes unless otherwise indicated. Exposed-to-view surfaces exhibiting imperfections inconsistent with existing materials are unacceptable.

2.2 MISCELLANEOUS MATERIALS

- A. Welding Electrodes and Filler Metal: Select according to AWS specifications for metal alloy welded; use metal type and alloy as recommended in writing by producer of metal to be welded or filled and as required for color match, strength, and compatibility in fabricated items.
- B. Brazing Rods for Cast Iron Components: Type and alloy as recommended in writing by brazing-rod manufacturer and as required for strength and compatibility in fabricated items.
- C. Fasteners: Fasteners of the same basic metal as fastened metal unless otherwise indicated. Use metals that are noncorrosive and compatible with each metal joined.
 - 1. Match existing fasteners in material and in type of fastener unless otherwise indicated.
 - 2. Use concealed fasteners for interconnecting cast-iron components and for attaching them to other work unless exposed fasteners are unavoidable or the existing fastening method.
 - 3. For exposed fasteners, use slotted machine screws of head profile flush with metal surface unless otherwise indicated or another head is required to match the existing fastening method as determined by Contracting Officer.
 - 4. Finish heads of exposed fasteners to match finish of metal fastened unless otherwise indicated.
- D. Anchors: Adhesive type or types indicated on Drawings with bolt heads of same basic metal as fastened metal unless otherwise indicated. Use metals that are noncorrosive and compatible with each metal anchored.
 - 1. Strength: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when

installed in concrete, as determined by testing according to ASTM E488 conducted by a qualified independent testing agency.

- E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended in writing by manufacturer for interior and exterior applications.

2.3 METAL FABRICATION

- A. Fabricate decorative metal items and components in sizes and profiles to match existing decorative metal, with accurate curves, lines, and angles. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
- B. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for fasteners. Use concealed fasteners where possible; use exposed fasteners to match existing work.
- C. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.
- D. Castings: Fabricate castings free of warp, cracks, blowholes, or other defects that impair strength or appearance. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks.
 - 1. Finish castings to match existing decorative metalwork.

2.4 FERROUS METAL FINISHES

- A. See Section 099600 "High-Performance Coating."

PART 3 - EXECUTION

3.1 HISTORIC DECORATIVE METAL REPLICATION, GENERAL

- A. Execution of the Work: In replicating historic items, disturb remaining existing work as minimally as possible and as follows:
 - 1. Sequence work to minimize time before protective coatings are applied.
 - 2. Replace or reproduce historic items where indicated or scheduled.
 - 3. Make installation of replicated items reversible whenever possible.
- B. Replicate Decorative Metal Item: Where indicated, duplicate existing items with new materials matching existing materials and features.
 - 1. Design heavily deteriorated or missing features of decorative metal with compatible materials, using surviving prototypes to create patterns or molds for duplicating.
 - 2. Do not use substitute materials unless otherwise indicated.

3.2 INSTALLATION

- A. Installing Sealant: See Section 079200 "Joint Sealants."

3.3 HISTORIC METAL SCHEDULE

- A. Treatment of Decorative and Structural Metals: See Drawings.

END OF SECTION 050374

SECTION 050383 - HISTORIC CAST IRON REPAIR

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes historic treatment of cast iron in the form of repair as follows:
 - 1. Repairing cast iron and replacing damaged and missing components in place.
 - 2. Removing and dismantling cast iron for shop repair and replacement of components; reinstalling repaired cast iron.
 - 3. Reanchoring cast iron to building structure.
- B. Related Requirements:
 - 1. Section 013591 "Historic Treatment Procedures" for general historic treatment requirements.
 - 2. Section 050383 "Historic Cast Iron Repair" for repairing historic cast iron.

1.2 DEFINITIONS

- A. Low-Pressure Spray: 100 to 400 psi (690 to 2750 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).
- B. Medium-Pressure Spray: 400 to 800 psi (2750 to 5510 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference in conjunction with the regularly scheduled progress meetings during construction, at Project site.
 - 1. Review minutes of Preliminary Historic Treatment Conference that pertain to historic treatment of decorative metal.
 - 2. Review methods and procedures related to historic cast-iron repair.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Include plans, elevations, and sections showing locations and extent of repair and replacement work, with enlarged details of replacement parts indicating materials, profiles, methods of attachment, accessory items, and finishes.
- C. Samples: For each exposed product and for each color and texture specified.
 - 1. Not Required.

- D. Metallurgical Tests: Contractor responsibility for testing to determine weldability at locations where existing metal or cast iron will be welded to new metal or cast iron.

1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For post-installed structural anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified historic cast-iron repair specialist. Experience in repairing, brazing, and welding wrought iron, steel, or cuprous metals and installing and finishing new cast-iron work is insufficient experience for historic cast-iron repair work.
 - 1. Historic Brazing-and-Welding Specialist: A qualified brazing-and-welding-repair specialist experienced with these repairs on historic cast iron. Have the brazing-and-welding specialist work under direction of the historic treatment specialist.
 - 2. Historic Metal-Stitching Specialist: A qualified metal-stitching-repair specialist experienced with metal stitching of historic cast iron. Have the metal-stitching specialist work under direction of the historic treatment specialist.
- B. Mockups: Prepare mockups of historic treatment repair processes to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation. Prepare mockups so they are inconspicuous.
 - 1. Repairing Metal Component: One cast-iron mockup demonstrating pinning and metal-stitching repairs on sample pieces of cast iron.
 - 2. Replacing Metal Component: One cast-iron mockup of a portion of the plates at the Lantern Level deck.
 - 3. Cast-Metal Components: Submit patterns, models, or plaster castings made from existing cast-iron item for each replacement casting required.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

- A. Provide metal materials made of the alloys, forms, and types that match existing metals and that have the ability to receive finishes matching existing finishes unless otherwise indicated.

2.2 PREPARATORY CLEANING MATERIALS

- A. Water: Potable.
- B. Hot Water: Water heated to a temperature of 140 to 160 deg F (60 to 71 deg C).

- C. Detergent Solution, Job Mixed: Solution prepared by mixing 2 cups (0.5 L) of tetrasodium pyrophosphate (TSPP), 1/2 cup (125 mL) of laundry detergent, and 20 quarts (20 L) of hot water for every 5 gal. (20 L) of solution required.
- D. Abrasive Materials:
 - 1. Abrasive Pads: Non-scratch, of the following type(s):
 - a. Abrasive Pad with Sponge: Combination plastic abrasive pad, consisting of a sponge enclosed with a woven urethane, polypropylene, or other plastic mesh or fabric, without other abrasive components that can scratch metal.
 - b. Abrasive Pad of Plant Fibers: Agave, loofa, or another tough plant fiber, without other abrasive components that can scratch metal.
 - 2. Medium Abrasives for Ferrous Metals: Aluminum-oxide paper, emery paper, fine steel wool, steel scrapers, and steel-wire brushes of various sizes.
 - 3. Medium Abrasives for Copper-Alloys: Extra-fine bronze wool or plastic abrasive pads.
- E. Wash Cloths: Lint-free, absorbent, durable cloth without abrasives that can scratch metal.
- F. Rust Remover: Manufacturer's standard phosphoric acid-based gel formulation, also called "naval jelly," for removing corrosion from iron and steel.

2.3 PINNING MATERIALS

- A. Pins: Threaded, stainless-steel rod, cut to length as required for each repair.
- B. Pinning Adhesive: Epoxy adhesive recommended in writing by adhesive manufacturer for bonding to cast iron.

2.4 METAL STITCHING MATERIALS

- A. Stitching Pins: Threaded steel screws sized for the thickness and condition of cast iron being repaired, with thread design that pulls the sides of a crack together, thereby both sealing the crack and adding strength to the repair.
- B. Locks: Multiple-dumbbell-shaped ties cut from steel sheet for installation in multiple thicknesses to add strength and distribute stresses in the cast iron as required for the thickness and condition of cast iron being repaired.

2.5 FASTENERS

- A. Fasteners: Fasteners of the same basic metal as fastened metal unless otherwise indicated. Use metals that are noncorrosive and compatible with each metal joined.
 - 1. Match existing fasteners in material and in type of fastener unless otherwise indicated.
 - 2. Use concealed fasteners for interconnecting cast-iron components and for attaching them to other work unless exposed fasteners are unavoidable or the existing fastening method.

3. For exposed fasteners, use slotted machine screws of head profile flush with metal surface unless otherwise indicated or another head is required to match the existing fastening method as determined by Contracting Officer.
 4. Finish heads of exposed fasteners to match finish of metal fastened unless otherwise indicated.
- B. Post-Installed Structural Anchors: Fastener systems with bolts of same basic metal as fastened metal, or stainless steel, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, as appropriate for the substrate.
1. Uses: Securing cast iron elements.
 2. Type: Adhesive anchor.
 3. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Type 316 stainless-steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).

2.6 ACCESSORIES

- A. Metal-Patching Compound: Two-part, epoxy- or polyester-resin, metal-patching compound; knife-grade formulation as recommended in writing by manufacturer for type of metal repair indicated, tooling time required for the detail of work, and site conditions. Compound shall be produced for filling cast iron that has deteriorated because of corrosion or deformation. Filler shall be capable of filling deep holes and spreading to feather edge.
- B. Brazing Rods for Cast Iron: Type and alloy as recommended in writing by brazing-rod manufacturer and as required for strength and compatibility with cast-iron items.
- C. Welding Electrodes and Filler Metal: Select according to AWS specifications for welding cast-iron; use compatible metal type and alloy as required for strength, and compatibility with cast-iron items.
- D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended in writing by manufacturer for interior and exterior applications.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.7 CAST-METAL FABRICATION

- A. Custom fabricate repairs of cast-iron items and components in sizes and profiles to match existing cast iron unless otherwise indicated, with accurate curves, lines, and angles. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
- B. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for fasteners. Use concealed fasteners where possible; use exposed fasteners to match existing work.

- C. Comply with AWS for recommended practices in welding and brazing. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.
- D. Castings: Fabricate castings free of warp, cracks, blowholes, or other defects that impair strength or appearance. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks.
 - 1. Finish castings to match existing cast-iron work.
 - 2. Replacement Casting for Handrail Bracket: Duplicate existing handrail bracket on the cast-iron railing of first-floor stairs in the lobby. Make molds from this bracket to create new cast-iron brackets.

2.8 FERROUS METAL FINISHES

- A. See Section 099600 "High-Performance Coating."

PART 3 - EXECUTION

3.1 HISTORIC CAST-IRON REPAIR, GENERAL

- A. Execution of the Work: In repairing historic items, disturb remaining existing work as minimally as possible and as follows:
 - 1. Stabilize cast iron to reestablish structural integrity and weather resistance while maintaining the existing form of each item.
 - 2. Remove deteriorated coatings and corrosion.
 - 3. Sequence work to minimize time before protective coatings are reapplied.
 - 4. Repair items where stabilization is insufficient to stop progress of deterioration.
 - 5. Repair items in place unless otherwise indicated and retain as much original material as possible.
 - 6. Replace or reproduce historic items where indicated or scheduled.
 - 7. Make historic treatment of materials reversible whenever possible.
 - 8. Install temporary protective measures to stabilize cast iron that is indicated to be repaired later.
- B. Mechanical Coating Removal: Use gentlest mechanical methods, such as scraping and wire brushing, that do not abrade metal substrate. Do not use abrasive methods, such as sanding, or power tools except as approved by Contracting Officer.
- C. Repairing Cast-Iron Items: Match existing features, retaining as much original material as possible to complete the repair.
- D. Replacing Cast-Iron Components: Where indicated, duplicate and replace items with new material matching existing.
 - 1. Replace heavily deteriorated or missing parts or features of cast iron with compatible materials, using surviving prototypes to create patterns or molds for duplicate replacements.

3.2 PREPARATORY CLEANING

- A. Perform preparatory cleaning before performing repair work.
 - 1. Brushes: If using wire brushes, use steel or stainless-steel brushes that are resistant to chemicals being used.
 - 2. Spray Equipment: Use spray equipment that provides controlled application at volume and pressure indicated, measured at nozzle. Adjust pressure and volume to ensure that spray methods do not damage surfaces.
 - a. Equip units with pressure gages.
 - b. For water-spray application, use fan-shaped spray that disperses water at an angle of 25 to 50 degrees.
 - c. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F (60 and 71 deg C) at flow rates indicated.
 - 3. Uniformity: Perform each cleaning method in a manner that results in uniform coverage of all surfaces, including corners, contours, and interstices, and that produces an even effect without streaks or damaging surfaces.
- B. Water Cleaning: Clean with water. Supplement with natural-fiber or plastic bristle brush and abrasive pads. Use small brushes to remove soil and loose paint from joints and crevices.
- C. Detergent Cleaning:
 - 1. Wet surface with water.
 - 2. Scrub surface with detergent solution and natural-fiber or plastic bristle brush and abrasive pads until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that surface remains wet.
 - 3. Rinse with water to remove detergent solution, soil, and loose paint.
- D. Chemical Rust Removal:
 - 1. Remove loose rust scale with approved, medium abrasives for ferrous metals.
 - 2. Apply rust remover with brushes or as recommended in writing by manufacturer.
 - 3. Allow rust remover to remain on surface for period recommended in writing by manufacturer or as determined by testing. Do not allow extended dwell time.
 - 4. Wipe off residue with mineral spirits and either steel wool or soft rags, or clean with method recommended in writing by manufacturer to remove residue.
 - 5. Dry immediately with clean, soft cloths. Follow direction of grain in metal.
 - 6. Prime immediately to prevent rust. Do not touch cleaned metal surface until primed.
- E. Mechanical Rust Removal:
 - 1. Remove rust with approved, medium abrasives for ferrous metals.
 - 2. Wipe off residue with mineral spirits and either steel wool or soft rags.
 - 3. Dry immediately with clean, soft cloths. Follow direction of grain in metal.
 - 4. Prime immediately to prevent rust. Do not touch cleaned metal surface until primed.

3.3 DISMANTLING, REPAIR, AND INSTALLATION

- A. Repair cast iron in place insofar as practicable unless otherwise indicated. Where necessary, dismantle components from their substrate and repair and reinstall them.
- B. Perform dismantling work as required in Section 024296 "Historic Removal and Dismantling."
- C. Installation:
 - 1. Locate and place cast-iron items level and plumb and in alignment with adjacent construction.
 - a. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
 - 2. Use concealed anchorages where possible unless otherwise indicated.
 - 3. Form tight joints with exposed connections accurately fitted together.
 - 4. Install concealed joint fillers, sealants, and flashings, as the Work progresses, to make exterior items weatherproof.
 - 5. Corrosion Protection: Apply bituminous paint or other permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with substrate materials that are incompatible or could result in corrosion or deterioration of either material or finish.
 - 6. Touch Up: At completion of installation, touch up and restore damaged or defaced finish surfaces and fastener heads.
- D. Sealant: See Section 079200 "Joint Sealants."

3.4 FILLING DEFECTS IN PAINTED SURFACES (Not Used)

3.5 PINNING

- A. Use cast-iron piece that has broken-off or a custom, cast replica of a similar item.
- B. Grind mating surfaces of base metal and repair piece along the repair seam to produce an accurate fit and alignment with the base assembly. Grind mating surfaces to produce joint size no larger than 1/32 inch (0.8 mm).
- C. Exposed Pinning: Before applying adhesive, prepare for mechanical anchorage consisting of 1/8-inch- (3-mm-) diameter, threaded stainless-steel pins set into 3/16-inch- (4.5-mm-) diameter holes drilled at through face of repair piece and into base metal. Insert pins at least 1 inch (25 mm) into base metal and 1 inch (25 mm) into repair piece with end countersunk at least 1/4 inch (6 mm) from exposed face of repair piece. For large pieces, center and space pins 3 inches (75 mm) apart and at least 1/4 inch (6 mm) from any edge.
- D. Concealed Pinning: Before applying adhesive, prepare for concealed mechanical anchorage consisting of 1/8-inch- (3-mm-) diameter, threaded stainless-steel pins set into aligned, 3/16-inch- (4.5-mm-) diameter holes drilled into base metal and into, but not through, the repair

piece. Insert pins at least 1 inch (25 mm) into base metal and 1 inch (25 mm) into repair piece. For large pieces, center and space pins 3 inches (75 mm) apart and at least 1/4 inch (6 mm) from any edge.

- E. Clean adhesive residue from exposed surfaces.

3.6 METAL STITCHING

- A. Install metal stitching materials according to written instructions of metal-stitching-system manufacturer for the thickness and condition of cast iron being repaired.
- B. Drill, tap, and install metal stitching pins along entire length of crack being repaired, overlapping the pins to ensure complete sealing and pulling together of sides of the crack.
- C. Cut slots shaped and sized to hold locks. Do not cut slots deeper than 90 percent of the thickness of the cast iron.
- D. Grind off metal-stitching materials that project above surface of cast iron without damaging cast-iron surface.

3.7 PRIMING

- A. Repair Primer: Apply immediately after completing a repair.
- B. Finish Primer: Apply as soon after cleaning as possible.

3.8 HISTORIC CAST-IRON REPAIR SCHEDULE

- A. Treatment of Cast-Iron: See Drawings.

END OF SECTION 050383

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Miscellaneous steel framing and supports.
 2. Metal floor plate and supports.
 3. Miscellaneous steel trim.

1.2 ACTION SUBMITTALS

- A. Product Data: For the following:
1. Nonslip aggregates and nonslip-aggregate surface finishes.
 2. Fasteners.
 3. Shop primers.
 4. Shrinkage-resisting grout.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- C. Metallurgical Tests: Contractor responsibility for testing to determine weldability at locations where existing metal or cast iron will be welded to new metal or cast iron.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Railings, handrail and handrail brackets, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
1. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
 2. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 3. Uniform and concentrated loads need not be assumed to act concurrently.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 316L.
- D. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 316 stainless steel fasteners for permanent use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, for temporary use. Select fasteners for type, grade, and class required.
- B. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; stainless steel. Provide bolts, washers, and shims as needed, all stainless steel.
- C. Post-Installed Anchors: Chemical anchors.
 - 1. Material for Interior and Exterior Locations: Type 316 stainless steel, unless otherwise indicated.

2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 099600 "High-Performance Coatings."
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- C. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.
- D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- E. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- F. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- H. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

- I. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 4000 psi.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. 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.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/16 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. 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 no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

2.7 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Hot dip galvanize all temporary miscellaneous steel trim.
- D. All permanent steel shall be Type 316 stainless steel.
- E. Prime miscellaneous steel trim with primer specified in Section 099600 "High-Performance Coatings."

2.8 GENERAL FINISH REQUIREMENTS

- A. Finish metal fabrications after assembly.

2.9 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize temporary items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 - 1. Shop prime with primers specified in Section 099600 "High-Performance Coatings".
- C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
 - 1. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. 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 surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. 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 no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 REPAIRS

- A. Touchup Painting:
 - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055000

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Framing with dimension lumber.
 - 2. Framing with engineered wood products.
 - 3. Plywood panels.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.

1.3 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.
- C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat all rough carpentry unless otherwise indicated.

2.3 DIMENSION LUMBER FRAMING

- A. Framing Other Than Non-Load-Bearing Partitions: No. 2 grade.
 - 1. Application: Framing.
 - 2. Species:
 - a. Southern pine; SPIB.

2.4 ENGINEERED WOOD PRODUCTS

- A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559.
 - 1. Extreme Fiber Stress in Bending, Edgewise: 2800 psi for 12-inch nominal- (286-mm actual-) depth members.
 - 2. Modulus of Elasticity, Edgewise: 2,000,000 psi (2.0E)
 - 3. Laminated-Veneer Lumber shall be pressure treated.
 - 4. Flashing is required on all upward facing horizontal surfaces.

2.5 PLYWOOD PANELS

- A. Plywood Panels: Plywood, DOC PS 1, Exterior, in thickness indicated or, if not indicated, not less than 1/2-inch (13-mm) nominal thickness.

2.6 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
- B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.

2.7 METAL FRAMING ANCHORS

- A. Allowable design loads, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- B. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.
 1. Use for wood-preservative-treated lumber and where indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- G. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

H. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).

END OF SECTION 061000

SECTION 075419 - POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Adhered polyvinyl chloride (PVC) roofing system for temporary roof.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1.3 INFORMATIONAL SUBMITTALS

A. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of compliance with performance requirements.

B. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes membrane roofing, base flashings, roof insulation, cover boards, and other components of roofing system.
2. Warranty Period: 20 years from date of Substantial Completion.

- B. Special Project Warranty: Submit roofing installer's warranty, signed by Installer, covering the Work of this Section, including all components of roofing system such as membrane roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.
- C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:
1. Zone 1 (Roof Area Field): 98 lbf/sq. ft. (kPa/sq. m).
 2. Zone 2 (Roof Area Perimeter): 222 lbf/sq. ft. (kPa/sq. m).
 - a. Location: From roof edge to 3 feet inside roof edge.
- D. FM Approvals' RoofNav Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in FM Approvals' RoofNav for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals Certification markings.
1. Fire/Windstorm Classification: Class 1A-120.
 2. Hail-Resistance Rating: FM Global Property Loss Prevention Data Sheet 1-34 VSH.
- E. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in SPRI's Directory of Roof Assemblies for roof assembly identical for that specified for this Project.
1. Wind Uplift Load Capacity: 120 psf.

2.2 POLYVINYL CHLORIDE (PVC) ROOFING

- A. PVC Sheet: ASTM D4434/D4434M, Type IV, fabric reinforced.
1. Thickness: 40 mils (1.0 mm).
 2. Exposed Face Color: White.

2.3 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
 - 1. Adhesives and Sealants: Comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet.
- C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.
- D. Bonding Adhesive: Manufacturer's standard.
- E. Water-Based, Fabric-Backed Membrane Adhesive: Roofing system manufacturer's standard water-based, cold-applied adhesive formulated for compatibility and use with fabric-backed membrane roofing.
- F. Low-Rise, Urethane, Fabric-Backed Membrane Adhesive: Roof system manufacturer's standard spray-applied, low-rise, two-component urethane adhesive formulated for compatibility and use with fabric-backed membrane roofing.
- G. Slip Sheet: ASTM D2178/D2178M, Type IV, glass fiber, asphalt-impregnated felt.
- H. Slip Sheet: Manufacturer's standard, of thickness required for application.
- I. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.
- J. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.
- K. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

3.2 PREPARATION

- A. Perform fastener-pullout tests according to roof system manufacturer's written instructions.
 - 1. Submit test result within 24 hours of performing tests.

- a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.

3.3 INSTALLATION OF ROOFING, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions, listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.4 INSTALLATION OF ADHERED ROOF MEMBRANE

- A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll roof membrane and allow to relax before installing.
- C. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.
- F. Fabric-Backed Roof Membrane Adhesive: Apply to substrate at rate required by manufacturer, and install fabric-backed roof membrane.
- G. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.
- H. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- I. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roof membrane and sheet flashings to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
 - 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 - 3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.

3.5 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing system for

deterioration and damage, describing its nature and extent in a written report, with copies to Contracting Officer.

- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075419

SECTION 076100 - SHEET METAL ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes custom-fabricated, flat-seam sheet metal roofing and flashing.

1.2 ACTION SUBMITTALS

- A. Product Data: For each of the following:

1. Roofing sheet metal.
2. Underlayment materials.
3. Fasteners.
4. Sealant tape.
5. Elastomeric sealant.
6. Butyl sealant.

- B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and panel installation layouts, expansion joint locations, points of fixity, and keyed details. Distinguish between shop- and field-assembled Work.
3. Include details for forming, including seams and dimensions.
4. Include details for joining and securing, including layout and spacing of fasteners, cleats, and other attachments. Include pattern of seams.
5. Include details of expansion joints, including showing direction of expansion and contraction from points of fixity.
6. Include details of roof penetrations.
7. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, corners, flashings, and counterflashings.
8. Include details of special conditions.
9. Include details of connections to adjoining work.

- C. Samples: For each exposed product and for each color and texture specified, 12 inches (300 mm) long by actual width.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Roof plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved.
- B. Sample Warranties: For special warranties.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing sheet metals and accessories to include in maintenance manuals.

1.5 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Sheet metal roofing system, including, but not limited to, metal roof panels, cleats, anchors and fasteners, sheet metal flashing integral with sheet metal roofing, fascia panels, trim, battens, underlayment, and accessories, shall comply with requirements without failure due to defective manufacture, fabrication, or installation, or due to other defects in construction. Sheet metal roofing shall remain watertight.
- B. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- C. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or indicated on Drawings.
- D. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- E. Copper Roofing Standard: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are specified or indicated on Drawings.
- F. Copper Roofing Standard: Comply with Revere Copper Product's "Copper and Common Sense." Conform to dimensions and profiles shown unless more stringent requirements are specified or indicated on Drawings.

- G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.

- 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 ROOFING SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

- B. Copper Sheet: ASTM B370 cold-rolled copper sheet, H00 temper.

- 1. Weight (Thickness): 20 oz./sq. ft. (0.70 mm thick) unless otherwise indicated.

- a. Batten Caps: 20 oz./sq. ft. (0.70 mm) thick.

- 2. Nonpatinated Exposed Finish: Mill.

- C. Roof-Penetration Flashing: Fabricate from the following materials:

- 1. Copper: 20 oz./sq. ft..

2.3 UNDERLAYMENT MATERIALS

- A. Felts: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felts.

- B. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over 220 deg F (111 deg C); and complying with physical requirements of ASTM D226/D226M for Type I and Type II felts.

- C. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils (0.76 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.

- 1. Thermal Stability: ASTM D1970/D1970M; stable after testing at 240 deg F (116 deg C) or higher.
 - 2. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F (29 deg C) or lower.

- D. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete roofing system and as recommended by primary sheet metal manufacturer unless otherwise indicated.
- B. Fasteners: Screws, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads of 132 pounds per square foot (psf) uplift (working level, not alternate strength).
 - 1. General:
 - a. Exposed Fasteners: Heads matching color of sheet metal roofing, using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of roofing.
 - b. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed; with hex-washer head.
 - c. Blind Fasteners: Copper or bronze rivets suitable for metal being fastened.
 - 2. Fasteners for Copper Sheet: Copper, hardware bronze, or passivated Series 300 stainless steel.
- C. Solder:
 - 1. For Copper: ASTM B32, Grade Sn50, 50 percent tin and 50 percent lead, or lead-free containing solder containing not less than 95% tin.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- E. Elastomeric Sealant: ASTM C920, elastomeric polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal roofing and remain watertight.
- F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

2.5 ACCESSORIES

- A. Sheet Metal Accessories: Provide components required for complete sheet metal roofing assembly, including trim, fasciae, corner units, clips, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items. Match material and finish of sheet metal roofing unless otherwise indicated.
 - 1. Cleats: Intermittent and continuous attachment devices for mechanically seaming into joints and formed from the following materials and thicknesses unless otherwise indicated:
 - a. Copper Roofing: 20- (0.70-thick) oz./sq. ft. (mm) copper sheet.

2. Expansion-Type Cleats: Cleats of a design that allows longitudinal movement of roof panels without stressing panel seams; of same material as other cleats.
 3. Backing Plates: Plates at roofing splices, fabricated from material recommended by SMACNA's "Architectural Sheet Metal Manual."
 4. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible-closure strips; cut or premolded to match sheet metal roofing profile. Provide closure strips where necessary to ensure weathertight construction.
 5. Flashing and Trim: Formed from same material and with same finish as sheet metal roofing, minimum 0.018 (0.46) inch (mm)thick.
- B. Roof Curbs: Fabricated from same material and finish as sheet metal roofing, minimum thickness matching the sheet metal roofing; with bottom of skirt profiled to match roof panel and seam profiles; with weatherproof top box and integral full-length cricket.
1. Fabricate curb subframing of nominal 0.062- (1.59-) inch (mm) thick, angle-, C- or Z-shaped, galvanized-steel or stainless steel sheet.
 2. Fabricate curb and subframing to withstand indicated loads of size and height indicated.
 3. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.
 4. Insulate curbs with 1- (25-) inch (mm)thick, rigid insulation.

2.6 FABRICATION

- A. Custom fabricate sheet metal roofing to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions (panel width and seam height), geometry, metal thickness, and other characteristics of installation. Fabricate sheet metal roofing and accessories in shop to greatest extent possible.
1. Flat-Seam Roofing: Form flat-seam panels from metal sheets.
- B. Form exposed sheet metal work to fit substrates with little oil canning; free of buckling and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
1. Lay out sheet metal roofing, so transverse seams, if required, are made in direction of flow, with higher panels overlapping lower panels.
 2. Offset transverse seams from each other 12 inches (300 mm) inches (mm)minimum.
 3. Fold and cleat eaves and transverse seams in shop.
 4. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings, and other components of metal roofing to profiles, patterns, and drainage arrangements indicated on Drawings and as required for leakproof construction.
- C. Built-In Gutters (Integral Gutters): Fabricate to cross section indicated, with riveted and soldered joints, complete with end pieces, outlet tubes, and other special accessories as required.
1. Fabricate expansion joints and accessories from same metal as gutters unless otherwise indicated.
 2. Fabricate gutters with built-in expansion joints.

- D. Expansion Provisions: Fabricate sheet metal roofing to allow for expansion in running work sufficient to prevent leakage, damage, and deterioration of the Work.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
- E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to SMACNA's "Architectural Sheet Metal Manual."
- F. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item required. Obtain field measurements for accurate fit before shop fabrication.
 - 1. Form exposed sheet metal accessories without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 2. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant.
 - 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces of accessories exposed to view.
 - 5. Fabricate cleats and attachment devices of sizes recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured.
- G. Do not use graphite pencils to mark metal surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking, that tops of fasteners are flush with surface, and that installation is within flatness tolerances required for finished roofing installation.
- B. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- C. Examine roughing-in for components and systems penetrating sheet metal roofing to verify actual locations of penetrations relative to seam locations of sheet metal roofing before installation.

3.2 PREPARATION

- A. Lay out panel arrangement, before installation of sheet metal roofing.

1. Space fasteners not more than 12 inches o.c.

3.3 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal roofing.
 1. Install in shingle fashion to shed water, with lapped joints of not less than 4 inches (100 mm).
 2. Apply from eave to ridge.
 3. Apply on roof not covered by self-adhering sheet underlayment.
- B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, according to manufacturers' written instructions, using adhesive where possible to minimize use of mechanical fasteners under sheet metal.
 1. Apply from eave to ridge.
 2. Apply on roof not covered by self-adhering sheet underlayment.
 3. Lap horizontal joints not less than 4 inches (100 mm).
 4. Lap end joints not less than 12 inches (300 mm).
- C. Self-Adhering High-Temperature Sheet Underlayment:
 1. Install self-adhering high-temperature sheet underlayment, wrinkle free.
 2. Prime substrate if recommended by underlayment manufacturer.
 3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
 4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses.
 5. Overlap side edges not less than 3-1/2 inches (90 mm).
 6. Roll laps and edges with roller.
 7. Cover underlayment within 14 days of installation.
 8. Install self-adhering high-temperature underlayment at the following locations:
 - a. Over entire roof.
- D. Install slip sheet, wrinkle free, over underlayment before installing sheet metal roofing and related flashing.
 1. Install in shingle fashion to shed water, with lapped joints of not less than 4 inches (100 mm).

3.4 INSTALLATION, GENERAL

- A. Install sheet metal roofing to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to installation characteristics required unless otherwise indicated on Drawings.

1. Install fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required for complete roofing system.
 2. Install sheet metal roofing true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder.
 3. Anchor sheet metal roofing and other components of the Work securely in place, with provisions for thermal and structural movement.
 4. Do not field cut sheet metal roofing by torch.
 5. Provide metal closures at peaks.
 6. Flash and seal sheet metal roofing with closure strips at eaves, rakes, and perimeter of all openings. Fasten with self-tapping screws.
 7. Locate and space fastenings in uniform vertical and horizontal alignment. Predrill panels for fasteners.
 8. Lap metal flashing over sheet metal roofing to direct moisture to run over and off roofing.
 9. Do not use graphite pencils to mark metal surfaces.
- B. Thermal Movement: Rigidly fasten metal roof panels to structure at only one location for each panel.
1. Allow remainder of panel to move freely for thermal expansion and contraction.
 2. Point of Fixity: Fasten each panel along a single common line of fixing located at center of panel length.
 3. Avoid attaching accessories through roof panels in manner that inhibits thermal movement.
- C. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- D. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended in SMACNA's "Architectural Sheet Metal Manual."
1. Coat concealed side of copper sheet metal roofing with primer recommended by coating Manufacturer where roofing contacts ferrous metal.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Fasciae:
1. Align bottom of sheet metal roofing and fasten with blind rivets, bolts, or self-tapping screws.
 2. Flash and seal sheet metal roofing with closure strips where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

3.5 CUSTOM-FABRICATED SHEET METAL ROOFING INSTALLATION

- A. Install sheet metal roofing system with lines and corners of exposed units true and accurate.

1. Form exposed faces flat and free of buckles, excessive waves, and avoidable tool marks, considering metal temper and reflectivity.
 2. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 3. Fold back sheet metal to form hem on concealed side of exposed edges unless otherwise indicated.
- B. Install cleats to hold sheet metal roofing panels in position.
1. Attach each cleat with at least two fasteners to prevent rotation.
 2. Space cleats not more than 8 inches o.c.
 3. Bend tabs over fastener head.
- C. Seal joints as required for watertight construction. For roofing with 3:12 slopes or less, use cleats at transverse seams.
1. Use sealant-filled joints unless otherwise indicated.
 - a. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant.
 - b. Form joints to completely conceal sealant.
 - c. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way.
 - d. Adjust setting proportionately for installation at higher ambient temperatures.
 - e. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- D. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.
1. Pre-tin edges of sheets with solder to a width of 1-1/2 inches (38 mm); however, reduce pre-tinning where pre-tinned surface would show in completed Work.
 2. Do not use torches for soldering.
 3. Heat surfaces to receive solder, and flow solder into joint.
 - a. Fill joint completely.
 - b. Completely remove flux and spatter from exposed surfaces.
 4. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.
- E. Flat-Seam Roofing:
1. Attach flat-seam metal panels to substrate with cleats, starting at eave and working upward toward ridge.
 2. After panels are in place, mallet seams tight and solder.
 3. Attach roofing panels with cleats spaced not more than 8 inches o.c. Lock and solder panels to base flashing.
 4. Attach edge flashing to face of roof edge with continuous cleat fastened to roof substrate at 6 inches o.c. spacing. Lock panels to edge flashing and solder.
- F. Built-In Gutters:

1. Anchor back edge of gutter with continuous cleat.
2. Provide expansion joints halfway between drainage point(s).
3. Join gutter sections with soldered joints.
 - a. Join sections with lapped joints sealed with sealant where required for expansion.
4. Provide for thermal expansion.
5. Slope gutters to drainage points.
6. Provide end closures and seal watertight with sealant.
7. Install self-adhering, high-temperature sheet underlayment inside built-in gutter as indicated on Drawings.
 - a. Extend self-adhering, high-temperature sheet underlayment to eave drip edges and beneath roof underlayment.
 - b. Lap edges 2 inches (50 mm).
 - c. Lap ends 4 inches (100 mm).

3.6 INSTALLATION OF ROOF FLASHINGS

- A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.
 1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
 2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.7 ACCESSORY INSTALLATION

- A. Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion.
 1. Coordinate installation with flashings and other components.
 2. Install components required for complete sheet metal roofing assembly, including trim, seam covers, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items.
- B. Flashing and Trim: Comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual."
 1. Provide concealed fasteners where possible, and install units true to line, levels, and slopes.
 2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
 3. Install flashing and trim as required to seal against weather and to provide finished appearance, including, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.

4. Install continuous strip of self-adhering underlayment at edge of continuous flashing overlapping self-adhering underlayment, where "continuous seal strip" is indicated in SMACNA's "Architectural Sheet Metal Manual" and on Drawings.
 5. Install exposed flashing and trim without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 6. Install sheet metal flashing and trim to fit substrates, and to result in waterproof and weather-resistant performance.
 7. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
 - a. Space expansion joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
 - b. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, and filled with butyl sealant concealed within joints.
 - c. Use lapped expansion joints only where indicated on Drawings.
- C. Pipe Flashing: Form flashing around pipe penetration and sheet metal roofing. Fasten and seal to sheet metal roofing as recommended in SMACNA's "Architectural Sheet Metal Manual."
- D. Roof Curbs: Install flashing around bases where curbs meet sheet metal roofing.

3.8 CLEANING

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. On completion of sheet metal roofing installation, clean finished surfaces as recommended by sheet metal roofing manufacturer.
- C. Clean and neutralize flux materials. Clean off excess solder.
- D. Clean off excess sealants.

3.9 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal roofing is installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Prohibit traffic of any kind on installed sheet metal roofing.
- C. Maintain sheet metal roofing in clean condition during construction.
- D. Replace sheet metal roofing components that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Contracting Officer.

END OF SECTION 076100

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.

B. Samples for Initial Selection: Manufacturer's standard color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

1.3 CLOSEOUT SUBMITTALS

A. Manufacturers' special warranties.

B. Installer's special warranties.

1.4 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

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

1.5 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain joint sealants from single manufacturer.

2.2 JOINT SEALANTS, GENERAL

- A. 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.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.
 - 1. Joint Locations:

- a. At the Lantern Level: between cast iron plates and the joint where the cast iron plate goes under the bottom rail of lantern wall.
- b. At the Watch Level: the joint where the concrete of the watch level exterior deck meets masonry wall.

2.4 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 100/50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Uses T and NT.
- B. Joint Sealant Application: Exterior joints in vertical surfaces and horizontal surfaces
 - 1. Joint Locations:
 - a. Joints in wood
 - b. Joints in masonry
 - c. joints between different materials listed above
 - d. Perimeter joints of exterior openings where indicated
 - e. Perimeter joints between frames of doors, windows, louvers, and adjacent materials

2.5 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.
- B. Joint Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces
 - 1. Joint Locations:
 - a. Perimeter joints of exterior openings where indicated
 - b. Perimeter joints between interior wall surfaces and frames of interior doors and windows

2.6 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin) Type O (open-cell material) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

2.7 MISCELLANEOUS MATERIALS

- A. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 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. Wood.
 - 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.
- B. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of 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.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants in accordance with requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile in accordance with Figure 8A in ASTM C1193 unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - a. Extent of Testing: Test completed and cured sealant joints as follows:
 - 1) Perform 10 tests for the first Insert dimension of joint length for each kind of sealant and joint substrate.

- b. Inspect tested joints and report on the following:
 - 1) Whether sealants filled joint cavities and are free of voids.
 - 2) Whether sealant dimensions and configurations comply with specified requirements.
- c. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.

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, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION

SECTION 085200 - WOOD WINDOWS AND DOORS

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 custom fabricated windows and doors to replace existing windows and doors with historically accurate windows and doors with profiles as noted on drawings.

- B. PREINSTALLATION MEETINGS

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

- 1. Review, discuss, and coordinate the interrelationship of wood windows with other exterior wall components. Include provisions for anchoring, flashing, weeping, sealing perimeters, and protecting finishes.
 - 2. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.3 ACTION SUBMITTALS

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

- 1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for wood windows.

- B. Shop Drawings: For wood windows.

- 1. Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

- C. Shop Drawings: For wood doors.

- 1. Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

1.4 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace wood windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, water leakage, and air infiltration.
 - b. Faulty operation of movable sash and hardware.
 - c. Deterioration of materials and finishes beyond normal weathering.
2. Warranty Period:
 - a. Window: 10 years from date of Substantial Completion.
 - b. Warranty Period for Exterior Doors: Two years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain wood windows from single source or from single manufacturer. Obtain wood doors from a single source or manufacturer

2.2 MATERIALS

- A. Species and Grade: Sapele (*Entandrophragma clindricum*).
 1. Maximum Moisture Content: 15%
 2. Finger Jointing: Not Allowed
- B. Adhesives for window sash, frame, and doors shall be Type 1 (moisture resistant)
- C. Fasteners: Aluminum, Nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with all materials and that meet other project requirements
 1. Unless unavoidable for applying hardware, do not use exposed fasteners

2.3 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 1. Window Certification: WDMA certified with label attached to each window.
- B. Windborne-Debris Impact Resistance: Passes ASTM E 1886 missile-impact and cyclic-pressure tests in accordance with ASTM E 1996 for Wind Zone 3 for basic protection.
 1. Large-Missile Test: For glazing located within 30 feet of grade.
 2. Small-Missile Test: For glazing located between 30 feet and 60 feet above grade.

2.4 WOOD WINDOWS

- A. Operating Types: Provide the following operating types in locations indicated on Drawings:
 - 1. Double hung.
- B. Frames and Sashes: Fine-grained wood lumber complying with AAMA/WDMA/CSA 101/I.S.2/A440; kiln dried to a moisture content of not more than 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch deep by 2 inches wide; water-repellent preservative treated.
 - 1. Exterior Finish: Manufacturer's standard factory-prime coat wood.
 - a. Color: As selected by CO from manufacturer's full range.
 - 2. Interior Finish: Manufacturer's standard factory-prime coat.
 - a. Color: As selected by CO from manufacturer's full range.
- C. Windborne-Debris-Impact-Resistant Laminated Glass: ASTM C 1172 with two plies of float glass.
 - 1. Float Glass: Fully tempered.
 - 2. Inner Ply: Clear.
 - 3. Interlayer: 0.090 inch.
 - 4. Outer Ply: Clear.
- D. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum or stainless steel, complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.
 - 1. Exposed Hardware Color and Finish: As selected by CO from manufacturer's full range.
- E. Hung Window Hardware:
 - 1. Counterbalancing Mechanism: Complying with AAMA 902, concealed, of size and capacity to hold sash stationary at any open position.
 - 2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.
- F. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
- G. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

2.5 EXTERIOR STILE AND RAIL WOOD DOORS

- 1. Panel Designs: As indicated on Drawings.

- a. Do not modify intended aesthetic effects, as judged solely by CO, except with CO's approval.
2. Finish: Opaque.

2.6 STILE AND RAIL WOOD DOOR FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels unless otherwise indicated:
 1. Clearances:
 - a. Provide 1/8 inch at heads, jambs, and between pairs of doors.
 - b. Where threshold is shown on Drawings or scheduled, provide not more than 3/8 inch from bottom of door to top of threshold.
 2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
- B. Factory machine doors for hardware that is not surface applied.
 1. Locate hardware to comply with DHI-WDHS-3.
 2. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
 3. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
- C. Transom and Side Panels:
 1. Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors.
 2. Fabricate door and transom panels with full-width, solid-lumber meeting rails.
- D. Exterior Doors: Factory treat exterior doors with water-repellent preservative after fabrication has been completed but before shop priming.

2.7 DOOR HARDWARE

- A. Antifriction-Bearing Hinges:
 1. Mounting: Full mortise (butts).
 2. Bearing Material: Ball bearing.
 3. Grade: Grade 1 (heavy weight).
 4. Base and Pin Metal:
 - a. Exterior Hinges: Stainless steel with stainless-steel pin.
 5. Pins: Non-rising loose unless otherwise indicated .
 6. Tips: Flat button.
 7. Corners: Square.

B. Mechanical Locks and Latches

1. Lock Backset: 2-3/4 inches (70 mm), unless otherwise indicated.
2. Lock Trim:
 - a. Levers: Cast.
 - b. Operating Device: Lever with escutcheons (roses).
3. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
 - a. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
4. Mortise Locks: BHMA A156.13; Operational Grade 1; stamped steel case with steel or brass parts; Series 1000.

C. Lock Cylinders

1. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
2. Standard Lock Cylinders: BHMA A156.5; Grade 1; permanent cores that are interchangeable; face finished to match lockset.
 - a. Number of Pins: Five.
 - b. Type: Mortise type.
3. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.
4. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

D. KEYING

1. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.
 - a. Existing System:
 - 1) Master key or grand master key locks to Owner's existing system

E. DOOR GASKETING

1. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

F. THRESHOLDS

1. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.
2. Saddle Thresholds:

- a. Type: Fluted top and offset

2.8 INSECT SCREENS

- A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.
 - 1. Type and Location: Full, inside.
 - 2. Material: Bronze metal screen

2.9 FABRICATION

- A. Fabricate wood windows in sizes indicated. Include a complete system for installing and anchoring windows.
- B. Glaze wood windows in the factory.
- C. Weather strip each operable sash to provide weathertight installation.
- D. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units.
- E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF WINDOWS AND DOORS

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
- B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

3.3 INSTALLATION OF HARDWARE

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as directed by Owner.
 - 2. Furnish permanent cores to Owner for installation.
- E. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."
- F. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- G. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- B. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.
 - 1. Keep protective films and coverings in place until final cleaning.
- C. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION

SECTION 090110.15 - PAINT AND COATING REMOVAL

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 DESCRIPTION

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the work of paint and coating removal as shown on the Drawings, as specified herein, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:
 - 1. Removing paint from masonry using chemical strippers and water rinsing. Assume a minimum of two (2) applications.
- B. Intent: It is the specific intent of this Section to provide for removing paints and coatings from surfaces as specified to provide substrates free of paints, coatings, and finishes without damaging or deteriorating elements and materials from which coatings have been removed and without damaging or deteriorating adjacent elements, materials, and finishes and other elements, materials, and finishes that are not part of the work of this Section. All work required to accomplish this intent shall be included as work of this Section.

1.3 QUALITY ASSURANCE

- A. Paint and Coating Removal Specialist: Award paint and coating removal work to firm regularly engaged in removing paints and coatings from historic building elements and materials similar to the paint and coating removal work required by this Section that can demonstrate to Owner's satisfaction that, within previous five years, the firm has successfully performed and completed in a timely manner at least three projects similar in scope and type to work required on this Project involving buildings designated as Landmarks by local governmental authorities, buildings listed in the National Register of Historic Places, or buildings listed in a State Register of Historic Places under the direction of preservation authorities.
 - 1. Foreman: Paint and coating removal work shall be directly supervised by a full-time foreman with experience equal to or greater than that required of Paint and Coating Removal Specialist. Same foreman shall remain on Project throughout work of this Section unless Owner deems foreman's performance unacceptable.
Mechanics: Paint and coating removal work shall be carried out by a steady crew of skilled mechanics who are thoroughly experienced in the removal of paints and coatings from historic building elements and materials and who have a minimum of five years' experience with work on historic buildings similar to that required by this Section. In

acceptance or rejection of work of this Section, no allowance will be made for workers' inattention or lack of skill.

- B. Laws, Codes, and Regulations: Work of this Section shall comply with applicable federal, state, and local laws, codes, and regulations.
- C. Referenced Standards: Comply with applicable requirements and recommendations of the latest editions of the referenced standards listed herein, except as modified by more stringent requirements of the Contract Documents and of applicable laws, codes, and regulations. In each case in which there is conflict between requirements of referenced standards; requirements of laws, codes, and regulations; and requirements of this Section, the most stringent or restrictive requirement shall govern.
 - 1. American Institute for Conservation of Historic & Artistic Works (AIC), *Code of Ethics and Guidelines for Practice*.
 - 2. United States Secretary of the Interior, *Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings*.
- D. Alternate Masonry Cleaning Methods: If Contractor proposes use of cleaning procedures and products other than those specified and Architect gives preliminary approval following required submittals, Contractor shall perform tests and create mock-ups demonstrating ability of proposed products and procedures to produce specified cleaning results and for comparison with specified mock-ups at no additional cost. No alternate method shall be permitted until Architect has approved it.
- E. Daily Log: Contractor shall keep onsite and available for inspection a daily log describing paint and coating removal operations. Log shall record temperature at beginning and ending of work, weather conditions, whether masonry was wet or dry prior to beginning work, personnel on site, areas cleaned and procedures used, areas inspected and accepted, and other relevant information.
- F. Access for Observation and Approvals: Provide Architect access on a continuing basis to locations on which mock-ups are being carried out, on which work is ongoing, and where work has been completed to allow for observation and approvals. Provide pipe scaffolding and manpower to move and reconfigure scaffolding and planking, personnel lift and manpower to operate lift, or other means of access complying with all laws and regulations regarding safety and acceptable to Architect. Provide manpower and equipment to facilitate observation and approvals.
 - 1. Extent of Access: Provide Architect with hands-on access to each and every surface from which paints and coatings have been removed. No approval of paint and coating removal work will be given before Architect is provided hands-on access to all surfaces from which paints and coatings have been removed. Provide access for reinspection of areas where paint and coating removal work was not approved on first or subsequent inspections until Architect approves work.
Relocation of Means of Access: If Contractor moves scaffolding, lift, or other means of access before providing Architect with hands-on access to each and every surface from which paints and coatings have been removed and to each and every surface from which paints and coatings have been removed after previous paint and coating removal work was rejected, Contractor shall reinstall means of access to provide for close-up inspection by Architect at no additional cost to Owner.

- G. Building Elevations Showing Masonry Cleaning Progress: On large-scale mounted elevations of the building indicate daily the following: areas currently being cleaned, areas previously cleaned but not yet accepted by Architect, and areas cleaned and accepted by Architect. Indicate required information using visual means acceptable to Architect.
- H. Measurements of Existing Conditions: Measure and record conditions at Project site to allow assessment of conditions during paint and coating removal work.
 - 1. Temperature Measurement: Measure temperature before beginning and during progress of work of this Section as required to ensure compliance with all specified conditions and manufacturer's recommendations for masonry cleaning.
 - 2. pH Measurement: Measure pH of masonry surfaces following chemical cleaning using non-staining litmus paper or litmus strips with appropriate range to ensure that each surface has been properly neutralized.
- I. Prohibited Materials and Methods: The following methods are strictly prohibited and shall not be used for work of this Contract: sandblasting, steam, and use of nonproprietary acids, alkalis, and other products not formulated specifically as products for masonry cleaning.
- J. Knowledge of Site and Project Conditions: Before submitting bid, Bidders shall make themselves thoroughly familiar with the Drawings and Specifications, with the scope of this Project, and with conditions at the Project site relating to requirements of this Section and limitations under which the work will be performed and shall determine or verify dimensions and quantities. Submission of a bid shall be considered conclusive evidence that Contractor is thoroughly familiar with Project requirements and site conditions and limitations.

1.4 SUBMITTALS

- A. General: Submit the following in compliance with the requirements of the Contract Documents. Revise and resubmit each item as required to obtain Architect's approval.
- B. Qualification Data: Submit qualification data for firm and personnel specified in "Quality Assurance" Article that demonstrates that both firm and personnel have capabilities and experience complying with requirements specified. For firm and foreman, provide a list of at least three completed projects similar in size and scope to work required on this Project. For each project list project name, address, architect, conservator, supervising preservation agency, scope of contractor's work, and other relevant information. Submit this information with the bid.
- C. Product Data: Manufacturer's published technical data for each product to be used in work of this Section including material description, chemical composition (ingredients and proportions), physical properties, recommendations for application and use, test reports and certificates verifying that product complies with specified requirements, and Safety Data Sheets (SDS). If materials other than those specified are submitted, submit Safety Data Sheets (SDS) for review of components only. Matters pertaining to safety of the materials themselves or their use will not be reviewed.

- D. Work Description: Prior to beginning paint and coating removal work on site, submit detailed written description of proposed removal work for each type of coating on each type of substrate. Submit new written descriptive information. Photocopies of Contract Documents, excerpts from Contract Documents, and/or duplication of text in Contract Documents will not be accepted for Work Description. Do not begin work on site until work description has been approved in writing. Description for each material on each substrate shall include, but not be limited to:
1. General Process: Materials, methods, tools, and equipment for each condition of removal work.
 2. Protection: Description, including drawings and diagrams, of proposed materials and methods of protection for preventing harm, damage, and deterioration caused by work of this Section to all persons (whether involved in the Work or not), building elements, materials, and finishes, surrounding landscape and site, and the environment (including air and water).
 3. Alternate Coating Removal Methods and Materials (If Any): Contractor proposed alternate methods and materials (if any) to those specified for paint and coating removal work. Provide evidence of successful use on comparable projects and demonstrate effectiveness for use on this Project.
- E. Waste Disposal Program: Proposed materials and methods for collection, treatment, and legal, offsite disposal of wastes resulting from work of this Section.
- F. Daily Log: Submit copy of daily log to Architect each week.
- G. Testing and Mock-Ups: Prepare test panels and mock-ups as described in Articles "Testing" and "Mock-Ups," below.

1.5 TESTING

- A. General: Before beginning mock-ups or general paint and coating removal work, test paint and coating removal methods on sample areas to determine most effective product and procedure for removing each type of coating from each substrate. A successful test is one where all loose and flaking paint and coatings are removed without causing damage or deterioration of the substrate. Tightly adhered paint and coatings may remain if required to prevent damage to substrate. Do not proceed with mock-ups or general paint and coating removal work until Architect has approved results of testing in writing.
1. Perform tests in locations directed by Architect.
 2. Notify Architect 48 hours prior to start of testing.
 3. Architect will monitor testing. No testing done in absence of Architect will be accepted.
 4. Use crew that will perform the work and follow requirements of this Section.
 5. Stop testing and remove product from surface immediately using appropriate solvent upon observing any adverse effect to substrate.
 6. After test panels are complete, allow 48 hours for drying and appearance of possible adverse effects prior to final evaluation.
 7. Perform additional testing as necessary to determine proper chemicals and procedures, including dwell times, to Architect's satisfaction.
- B. Provide the Following Test Panels

1. Removing Paint from Masonry Using Chemical Strippers and Water Rinsing: Prepare at least one 1-sq.-ft. test panel on each type of masonry from which paint is to be removed using chemical stripper specified for testing. Assume two (2) applications of stripper followed by water rinsing. Provide additional test panels using different application methods, dwell times, and removal methods as directed.

1.6 MOCK-UPS

- A. General: Before beginning general paint and coating removal work, prepare mock-ups to provide standards for paint and coating removal work. Do not proceed with paint and coating removal work until Architect has approved mock-ups.
 1. Locate mock-ups as directed by Architect.
 2. Notify Architect 48 hours prior to start of each mock-up.
 3. Architect will monitor mock-ups. Mock-ups not performed in presence of Architect will be rejected.
 4. Use crew that will execute the work and follow requirements of this Section.
 5. Repeat mock-ups as necessary to obtain Architect's approval.
 6. Allow mock-ups to dry for one week to allow natural color to return and problems to appear. Notify Architect when mock-ups are ready for inspection.
 7. Protect approved mock-ups to ensure that they are without damage, deterioration, or alteration at time of Substantial Completion.
 8. Approved mock-ups in undamaged condition at time of Substantial Completion may be incorporated into the Work.
 9. Approved mock-ups will represent minimum standards for paint and coating removal work. Subsequent paint and coating removal work that does not meet standards of approved mock-ups will be rejected.
- B. Prepare the Following Mock-Ups
 1. Removing Paint from Masonry: One panel, 36 sq. ft., for each type of paint on each type of masonry from which paint is to be removed.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in manufacturer's original containers with labels identifying manufacturer, product, ingredients, instructions for use, and safety precautions. Do not deliver products until SDS sheets for products are available on site.
- B. Deliver, store, and handle products and materials to prevent damage, deterioration, or degradation and intrusion of foreign material.
- C. Discard and remove from site deteriorated materials, contaminated materials, and products that have exceeded their expiration dates. Replace with fresh materials.

1.8 PROJECT CONDITIONS

- A. Safety: Protect all persons, whether or not they are involved with work of this Section, from harm caused by work of this Section.
1. Erect temporary protective covers at doorways to building that must remain in operation during course of masonry cleaning work when work is ongoing around or above doorways.
 2. Provide protection to prevent persons, except properly protected masonry cleaning personnel, from coming in contact with paint and coating removal materials and waste from paint and coating removal process.
 3. Ensure adequate ventilation during work of this Section.
 4. Provide workers all means of protection necessary to prevent harm caused by work of this Section.
- B. Protection of Building: Protect building elements and finishes from damage and from deterioration caused by work of this Section. Repair damage to materials and damage to finishes to Architect's satisfaction at no additional cost to Owner.
1. Adjacent Materials: Protect adjacent materials, including but not limited to masonry, metals, glass, paint, and sealants, from paint and coating removal materials and abrasives that might adversely affect such materials.
 2. Spread of Paint and Coating Removal Materials: Do not remove paints and coatings during winds of sufficient force to spread paint and coating removal materials to unprotected surfaces. Cease paint and coating removal operations when winds may carry chemicals, rinse water, or run-off from removal operations to unprotected areas.
 3. Monitoring for Water Entry: During periods when water, detergents, or chemicals are being applied to the exterior masonry, Contractor shall designate one trained person to examine interior spaces and surfaces for evidence of water infiltration. If water infiltration is detected, masonry cleaning operations shall cease immediately. Masonry cleaning operations shall not proceed until cause of infiltration has been eliminated.
 4. Take precautions necessary to prevent fire and spread of fire.
 - a. Do not use torches, heat guns, or any other heat generating equipment to remove paint.
 - b. Place paint- or solvent-soaked rags, waste, overalls, and other material that might constitute a fire hazard in metal containers and remove from Project site daily.
- C. Protection of Surroundings: Protect adjacent buildings, site, landscape features, public rights of way, motor vehicles, and other surrounding elements from damage and from deterioration resulting from paint and coating removal work.
1. Collect and dispose of runoff and residue from paint and coating removal operations by legal means and in manner that prevents soil erosion, undermining of paving and foundations, damage to sidewalks, water penetration into building interiors, and harm to buildings, landscape elements, and natural bodies of water and water table.

- D. Surfaces To Receive Work: The Drawings are two-dimensional representations of three-dimensional objects and do not show all surfaces of building components on which work is to be performed, including surfaces concealed from view behind objects shown; surfaces of projections, reveals, returns, and other elements perpendicular to or at an oblique angle to surfaces shown. Perform work on surfaces of projections, reveals, and returns associated with surfaces indicated to receive work and on surfaces of building components concealed behind building components shown. It is the specific intent of the Contract Documents to include work on all surfaces within Project area, whether or not shown on the Drawings, except as specifically indicated otherwise.
- E. Coordination: Coordinate work of this Section with other work to ensure proper completion of the Work.
 - 1. Staging: Schedule and stage paint and coating removal so that no runoff from paint and coating removal operations comes in contact with previously cleaned masonry.
- F. Preconstruction Meeting: Convene a preconstruction meeting to discuss paint and coating removal and its effect on adjacent elements, materials, and finishes. Attendees shall include Owner's Representatives, Architect, Construction Manager, firm(s) that will perform paint and coating removal, and other entities that might be affected by paint and coating removal work.

1.9 LEAD-CONTAINING PAINT (LCP)

- A. General: Perform work that disturbs lead-containing paint (LCP), handle material that involves lead-containing paint, and transport and dispose of lead-containing paint and residue in compliance with applicable federal, state, and local laws and regulations for identification, removal, labeling, handling, containerization, transportation, and disposal of lead-containing material including, but not limited to, those referenced herein.
- B. U.S. Department of Labor OSHA Regulations: Including but not limited to: Title 29, Code of Federal Regulations (CFR) Section 1926.62: "Lead Exposure in Construction" and Title 29, CFR Section 1910.1200: "Hazard Communication Standard."
- C. U.S. Environmental Protection Agency (USEPA) Regulations: Including but not limited to: Title 40 CFR Part 262: "Standards Applicable to Generators of Hazardous Waste" and Part 263: "Standards Applicable to Transporters of Hazardous Waste."
- D. U.S. Department of Transportation (USDOT) Regulations: Including but not limited to: 49 CFR Parts 172, 173, 174, 175, 177, 178, 179, and 180.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Temperature Requirements: Use coating removers only when temperature of air, temperature of substrate, and temperature of remover comply with manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 CHEMICAL PAINT AND COATING REMOVERS

A. General

1. Specified Strippers: Furnish specified strippers for mock-ups and for general paint and coating removal work.
2. Alternatives: Alternative strippers may be selected based on Project conditions. Furnish products selected for paint and coating removal at no additional cost to Owner.

B. Solvent Paint Removers: Subject to compliance with requirements, provide for testing of a benzyl alcohol-based gel paint remover designed for a less than 24-hour dwell time and specifically for use on historic masonry, such as:

1. Smart-Strip Pro, as manufactured by Dumond Chemicals, Inc., 1475 Phoenixville Pike - Suite 18, West Chester, PA 19380, (800) 245-1191, or approved equal.

2.2 MISCELLANEOUS TOOLS AND EQUIPMENT

A. Pressure Pumps: Pressure pumps capable of producing water flow at a rate of 6 gallons per minute at a pressure of 800 psi at nozzle on end of hose. Pumps, or a combination of pumps plus pressure reducing valves, shall have capability of providing water at a steady pressure and flow rate at all pressures from 100 psi to 800 psi. Pumps shall have working pressure gauges. Pumps found to be without working pressure gauges shall be removed from site, and work shall cease until pumps have been replaced with pumps having working pressure gauges. Pumps shall have no ferrous elements in contact with liquid stream.

B. Particulate Filter: Provide a 5-micron particulate filter in line with water supply. All water used for stone masonry cleaning shall be filtered.

1. Replace particulate filter as required to provide filtered water with no particles greater than 5 microns at pressure and flow rate specified.

C. In-line Pressure Gauges: Each water line used for pressure rinsing shall have a working pressure gauge within 15 feet of nozzle used for rinsing.

D. Spray Nozzles for Pressure Rinsing: Nozzles shall be of nonferrous metal and shall have a minimum 15-degree fan tip.

E. Vacuum for Rinse Water and Cleaning Effluent Collection: Wet/dry vacuum of sufficient capacity to collect effluent.

F. Buckets for Cleaning Compounds and Rinsing: Molded rubber or plastic buckets.

G. Brushes: Natural fiber bristle or synthetic fiber bristle only. No metal bristle brushes are permitted.

H. Tools for Removing Paint and Chemical Strippers: Plastic scrapers and putty knives with rounded edges that will not scratch substrate.

- I. Non-metallic, non-woven, nylon cleaning pads.
- J. Sponges: Clean natural sponges in various sizes for rinsing.
- K. Cloths: Clean, lint-free cotton rags and cheesecloth.
- L. pH Strips: Non-staining, strips of appropriate range. Furnish pH strips onsite for the duration of work of this Section.

2.3 MISCELLANEOUS MATERIALS

- A. Protection Materials: Provide materials recommended by cleaner manufacturers for products to be used that will protect from damage caused by chemicals without causing damage to materials to be protected.
 - 1. Glass and Metal Protection: Water-based, non-acidic, pigmented, removable coating such as "Strippable Acid Stop" manufactured by ProSoCo, Inc., or approved equal.
 - 2. Plastic Sheeting: Polyethylene sheeting, 6 mils thick minimum.

PART 3 - EXECUTION

3.1 PROTECTION

- A. General: Install protection and waste collection systems as described in approved Work Description prior to start of work.
- B. Protection from Hazardous Materials: Erect protection as necessary to protect workers, public, and environment from hazardous materials, including, but not limited to, lead-based paint, chemicals, abrasives, and dust.
- C. Protection of Adjacent Materials: Erect protection to prevent materials not to be stripped from damage and from deterioration resulting from water, chemicals, abrasives, coating residues, and other work of paint and coating removal.
- D. Waste Collection and Disposal: Provide containment system to collect and treat water, abrasives, coating residues, and other materials of this Section. Dispose of collected materials legally offsite.

3.2 MOCK-UPS

- A. General: Provide mock-ups under direction of Architect following requirements of "Mock-Ups" Article, above, to confirm products and procedures selected during testing and to provide standards for evaluation of the masonry cleaning work.

3.3 PAINT AND COATING REMOVAL, GENERAL

- A. General: Perform paint and coating removal in a manner that results in removing paints and coatings to clean substrates and provides condition matching that of approved mock-ups using least aggressive method that removes paint from specified surfaces.
- B. Manufacturer's Recommendations: Apply and remove stripping materials to comply with manufacturer's recommendations using procedures developed during testing and mock-ups.
- C. Uniform Results: Perform stripping in a manner that achieves uniform results on all surfaces, including corners and moldings, without streaking or damage.
- D. Cleaning and Neutralization: Clean residue from stripped surfaces at completion of stripping, leaving surface in optimum condition to accept specified finish.

3.4 REMOVING PAINT FROM MASONRY USING CHEMICAL STRIPPERS AND PRESSURIZED WATER RINSING

- A. General: Remove paint from masonry using stripper confirmed during mock-up to achieve masonry surface free of paint matching approved mock-up to Architect's satisfaction.
- B. Stripper Application and Removal: Apply stripper following method of application and dwell time determined during testing and confirmed during mock-ups. Remove stripper and paint following manufacturer's directions. Rinse surface thoroughly using water at a pressure not to exceed 500 psi, overlapping passes slightly.
- C. Additional Removal: Repeat above procedure as necessary to achieve uniformly clean masonry free of paint with surface matching standard of approved mock-up.

3.5 CLEAN-UP AND PROTECTION

- A. Clean-up: Properly contain run-off and debris from paint and coating removal. Remove rubbish, rags, and effluent from site at end of each workday, in appropriately marked containers. Dispose of material generated by work of this Section offsite in a legal manner.
- B. Protection: Protect work of other trades against damage and deterioration by paint and coating removal work. Correct damage by cleaning, repairing, or replacing elements, materials, and finishes damaged or deteriorated by paint and coating removal work, as acceptable to Architect, at no additional cost to Owner.

END OF SECTION

SECTION 099113 - EXTERIOR PAINTING

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. Primers.
 - 2. Finish coatings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include preparation requirements and application instructions.
 - 2. Indicate VOC content.

1.4 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. CO will select one surface to represent surfaces and conditions for application of each paint system.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

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 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 PAINT PRODUCTS, 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 topcoat manufacturer for use in paint system and on substrate indicated.
- B. Colors: As selected by CO from manufacturer's full range.
 - 1. Refer to drawings, portion of surface area will be painted with deep tones.

2.2 PRIMERS

- A. Exterior, Latex Wood Primer: White, waterborne-emulsion primer formulated for resistance to extractive bleeding, mold, and microbials; for hiding stains; and for use on exterior wood subject to extractive bleeding.

2.3 FINISH COATINGS

- A. Exterior Latex Paint, Semigloss: Water-based, pigmented emulsion coating formulated for alkali, mold, microbial, and water resistance and for use on exterior surfaces, such as masonry, portland cement plaster, and primed wood and metal.
 - 1. Gloss Level: Manufacturer's standard semigloss finish.

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 the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Wood: 15 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility, with finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and 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. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems specified in this Section.
- D. Wood Substrates:
 - 1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
 - 2. Sand surfaces that will be exposed to view, and remove sanding dust.
 - 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.

3.3 INSTALLATION

- A. Apply paints in accordance with manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 - 4. Paint entire exposed surface of window frames and sashes.
 - 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 6. Primers specified in the Exterior Painting Schedule may be omitted on items that are factory primed or factory finished if compatible with intermediate and topcoat coatings and acceptable to intermediate and topcoat paint manufacturers.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. 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.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
 - 1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
 - 2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
 - 3. Allow empty paint cans to dry before disposal.
 - 4. Collect waste paint by type and deliver to recycling or collection facility.
- 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.

3.5 EXTERIOR PAINTING SCHEDULE

- A. Dressed-Lumber Substrates: All exterior & interior Trim, Doors, Windows.

- 1. Latex over Latex Primer System :
 - a. Prime Coat: Exterior, latex wood primer, MPI #6.
 - b. Intermediate Coat: Matching topcoat.
 - c. Topcoat: Exterior latex paint, semigloss, MPT #11.

END OF SECTION

SECTION 099123 - INTERIOR PAINTING

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 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include preparation requirements and application instructions.
 - 2. Indicate VOC content.
- B. Sustainable Design Submittals:

1.3 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.

1.4 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 when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 PAINT PRODUCTS, GENERAL

- A. Material Compatibility:
 - 1. Materials for use within each paint system shall be 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- B. Low-Emitting Materials: For field applications that are inside the weatherproofing system, 90 percent of paints and coatings shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. VOC Emissions: For field applications inside the building, wall paints shall contain no more than half of the chronic REL of VOCs when tested according to the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." The building concentration of formaldehyde shall not exceed half of the indoor recommended exposure limit or 33 mcg/cu. m and that of acetaldehyde shall not exceed 9 mcg/cu. m.
- D. Colors: As selected by Architect from manufacturer's full range.

2.2 PRIMERS

- A. Interior Latex Primer Sealer: Water-based latex sealer used on new interior plaster, concrete, and gypsum wallboard surfaces.

2.3 WATER-BASED FINISH COATS

- A. Interior, Latex, Satin: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.
 1. Gloss and Sheen Level: Manufacturer's standard low-sheen finish.

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 the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Fiber-Cement Board: 12 percent.
 2. Wood: 15 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and 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. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. 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.

3.3 INSTALLATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. 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.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. 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.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

- D. 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.
- E. Painting Fire-Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed in equipment rooms:
 - a. Uninsulated metal piping.
 - b. Uninsulated plastic piping.
 - c. Pipe hangers and supports.
 - d. Metal conduit.
 - e. Tanks that do not have factory-applied final finishes.
 - 2. Paint the following work where exposed in occupied spaces:
 - a. Uninsulated metal piping.
 - b. Uninsulated plastic piping.
 - c. Pipe hangers and supports.
 - d. Metal conduit.
 - e. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
 - 1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
 - 2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
 - 3. Allow empty paint cans to dry before disposal.
 - 4. Collect waste paint by type and deliver to recycling or collection facility.
- 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.

3.5 INTERIOR PAINTING SCHEDULE

A. Galvanized-Metal Substrates:

1. High-Performance Architectural Latex System :
 - a. Prime Coat: Water-based galvanized primer.
 - b. Intermediate Coat: Matching topcoat.
 - c. Topcoat: Interior, latex, high-performance architectural coating, low sheen.

B. Stainless Steel Substrates:

1. High-Performance Architectural Latex System:
 - a. Prime Coat: Solvent-based bonding primer.
 - b. Intermediate Coat: Matching topcoat.
 - c. Topcoat: Interior, latex, high-performance architectural coating, low sheen.

C. Wood Traffic Surfaces: Floors.

1. Latex Porch and Floor Enamel System :
 - a. Prime Coat: Interior alkyd primer sealer.
 - b. Intermediate Coat: Matching topcoat.
 - c. Topcoat: Latex floor paint, low gloss.

D. Plastic Substrates:

1. Latex System :
 - a. Prime Coat: Solvent-based bonding primer.
 - b. Intermediate Coat: Matching topcoat.
 - c. Topcoat: Interior, latex, low sheen.

END OF SECTION

SECTION 099133 -MINERAL SILICATE EXTERIOR PAINTS/COATINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Application of a primer coat and a minimum of two coats of exterior mineral silicate paint/coating.
- B. Related Sections: Related sections include the following:
 - 1. Section 090110.15 - Paint & Coating Removal
 - 2. Section 042200 - Concrete Unit Masonry
 - 3. Section 092523 - Stucco Repairs
 - 4. Section 092400 - Portland Cement Plastering
 - 5. Section 092523 - Lime Based Plastering
 - 6. Section 092533 - Lime Cement Based Plastering

1.2 REFERENCES

- A. General: The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
- B. ASTM (ASTM):
 - 1. ASTM E 96, "Standard Test Methods for Water Vapor Transmission of Materials."
 - 2. ASTM E 514, "Standard Test Method for Water Penetration and Leakage Through Masonry."
 - 3. ASTM G 154, "Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials."
 - 4. ASTM D 6886-12, "Standard Test Method for Determination of the Individual Volatile Organic Compounds (VOCs) in Air-Dry Coatings by Gas Chromatography."

1.3 DEFINITIONS

- A. Mineral Silicate paint/coating, base coat: The first applied coat of the mineral silicate paint/coating.
- B. Mineral Silicate paint/coating, top coat: The second applied coat of the mineral silicate paint/coating.
- C. Fixative: A Potassium Silicate solution for Thinning Mineral Silicate paints, Priming absorbent surfaces and Consolidating dusting and sanding substrates.

1.4 SYSTEM DESCRIPTION

- A. A materials-compatible highly vapor permeable decorative coating system offering strong weathering protection for exterior exposure.
 - 1. Mineral Silicate Paint/Coating: An incombustible two coat system comprising of a "Fine" smooth base coat and a "Fine" smooth top coat.
 - a. Mineral Silicate paint/coating penetrates the surface and chemically reacts to combine with the substrate through chemical bonds forming a hard amorphous microporous layer with extremely high vapor permeability.
 - b. Unaffected by acids, UV exposure, or air-borne pollutants.
 - c. Unique alkaline mineral layer structure protects against liquid water penetration into the coated substrate and maintains moisture balance through vapor diffusion to keep wall assemblies breathable and dry, thus resisting mold and biological growth.
 - d. Will not reduce substrate vapor permeability.

1.5 SUBMITTALS

- A. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications. Provide published documentation describing materials, characteristics, and limitations.
- B. Samples: Submit samples for verification purposes, fabrication techniques and workmanship.

1.6 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer Qualifications: Provide evidence that Manufacturer is a firm engaged in the manufacture of mineral silicate paint/coatings of types required, and whose products have been in use for a minimum of fifteen years.
 - 2. Applicator Qualifications:
 - a. Provide evidence Applicator having a minimum of three years of successful application experience with projects similar in type and scope to that required for this project, and having passed a product certification training course provided by the manufacturer prior to the execution of this unit of work.
- B. Mock ups:
 - 1. Prior to application of the work, locate mock ups in coordination with the CO in situ on base of lighthouse for each type of finish and application to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution.
 - 2. The two colors of the mockup shall be an area of minimum 5'-0" x 5'-0" square

3. Maintain a record of approved mock up's product mixing and application steps to incorporate into final unit of work to ensure color consistency and textural aesthetics.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with manufacturer's name, material and product brand name, and lot number, if any.
- B. Store materials in their original undamaged packages and containers inside a well ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity. Check Manufacturers Product data for additional storage information.

1.8 PROJECT CONDITIONS

- A. Environmental Requirements:
 1. Do not apply in freezing conditions, when rain is expected, or in high winds.

1.9 WARRANTY

- A. Provide manufacturer's written product warranty.
 1. Warranty period from date of Substantial Completion is 15 years.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Consolidating Primer: Provide a consolidating primer compatible with the mineral silicate coating. Product to be a silicate binding and fixing agent
- B. Mineral Silicate Paint/Coating, Base Coat and Top Coat: Provide mineral silicate based opaque paint/coating meeting or conforming to:
 1. ASTM E 96 Vapor Permeability - 75 to 85 perms.
 2. ASTM G 154 Accelerated Weathering - no fading, cracking, peeling.
 3. ASTM E 514 62-MPH Wind-Driven Rain Test - no water penetration.
 4. ASTM D 6886-12 Standard Test Method for Individual Volatile Organic Compounds (VOCs) - Less than 5 grams per liter VOC (Volatile Organic Content) white or fully tinted.
 5. Tinted to the desired finish color
- C. Thinner for Mineral Silicate Paint/Coating: Provide a Pure Potassium Silicate solution free from organic content.

1. Dilute per manufacturer recommendations

2.2 EQUIPMENT

A. Tools:

1. Mineral Silicate Paint/Coating, Primer, Base and Top Coats: Apply by natural bristle façade brush, professional roller, or professional airless spray equipment and back-roll as required for even distribution.

2.3 FINISHES

A. Mineral Silicate Paint/Coating, Base and Top Coats:

1. Apply in full coverage evenly distributed coats to a smooth mineral matte finish without lap lines, voids, "holidays", or drips. Compare manufacturer-verified mock up consumption data with application consumption data to ensure enough product is applied.
2. Maintain a wet edge and even coat to prevent sight lines and textural differences.
3. Apply enough product to prevent shading and textural differences in the base coat that contribute to striping. Apply product without stops on continuous surfaces from corner to corner.
4. When rolling product, roll off finishing in same direction across the entire façade to prevent shading differences that can affect appearance and color.
5. When spraying product:
 - a. Do not strain mineral silicate base coat.
 - b. Remove paint filters from spray gun and spray pump.
 - c. Use only new hoses. Used hoses may contain paint thinners or solvents.
 - d. Paint thinners and cleaning solvents are not compatible with mineral silicate paints/coatings.
 - e. Clear gun and spray equipment with warm soapy water and rinse well with clean water to remove residual paint thinners and solvents.
 - f. Never use tips with smaller orifices than recommended. Smaller tips clog and prevent proper coating application. Improper application voids warranty and shortens longevity of the coatings.
 - g. Prevent overspray drift or misting onto glass or other surfaces which you do not intend to coat.
6. When working from scaffolding, work as a team moving across façade maximum eight (8) vertical feet per applicator to ensure complete coverage and maintaining a wet edge. Working left to right and top to bottom of each section.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Confirm by examination the areas and conditions under which the work is to be applied for compliance with manufacturer's instructions. Do not proceed with the work until unsatisfactory conditions have been corrected.
 - 1. Verify substrate is secure, sound, dry, and absorbent, and free of dirt, grease, salts, oil-based paints, release agents, curing agents, previous utilized paint stripper, and other bond breakers.
 - 2. Verify substrate has no pretreatments or priming materials applied unless such conditions are approved by manufacturer.
 - 3. Verify surfaces or materials to be coated are fully cured to manufacturer recommendations.
 - 4. Verify surfaces or materials to be coated are not sanding, chalking or highly absorbent.

3.2 PREPARATION

- A. Protection:
 - 1. Lay ground cloths and take measures as necessary to protect surfaces subject to contact by products specified by this Section.
 - 2. Mineral Silicate Paint/Coatings may etch or bond to glass, metal, and concrete.
- B. Clean surfaces using specified cleaner.
- C. Patch cracks, holes, and voids using specified patching compound.

3.3 APPLICATION

- A. Conform to reviewed product data, manufacturer's written instructions, and provisions of the Contract Documents.
- B. Plan the work properly.
 - 1. Maintain temperature during and after application. Refer to manufacturers recommendations for substrate and ambient air temperature and humidity requirements.
 - 2. Work ahead of the sun on shaded façades to avoid working on hot substrates.
 - 3. Work to logical stopping points (corners, seams, architectural features, etc.).
 - 4. Apply mineral silicate paints/coatings as directed by 2.3 FINISHES.
 - 5. Protect from wind and rain prior to, during, and for a minimum 24 hours after application.
 - 6. Obtain manufacturer's written instructions for application outside of the above parameters.

C. Mineral Silicate Paint/Coating:

1. Pretreatment for highly absorbent surfaces and sanding or chalking substrates:
 - a. Prime highly absorbent surfaces and sanding or chalking substrates with a solution of Fixative and water according to manufactures recommendations.
2. Base Coat:
 - a. Following manufacturers recommendations thin & stir mineral silicate fine paint/coating.
 - b. Apply base coat of thinned or unthinned mineral silicate fine paint/coating.
 - c. Allow for manufacturers recommended drying time.
3. Top Coat:
 - a. Do not thin mineral silicate fine paint/coating. Stir per manufacturers recommendations.
 - b. Apply top coat of mineral silicate paint/coating.
4. Touch Up:
 - a. If touchup is required, test a sample area to verify color match. If color or area which was touched up does not match the adjacent surface, recoat entire color section.
 - b. When touching up or recoating, use the same tools and techniques for best results.

3.4 CLEANING

- A. Clean tools, spills, and accidental drips immediately with plenty of water.
- B. Leave applications clean and premises free from residue and debris from work of this Section.

END OF SECTION

SECTION 099600 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of high-performance coating systems on the following substrates:

- 1. Exterior and Interior Substrates:

- a. Steel.
 - b. Stainless steel.
 - c. Cast iron.

1.2 DEFINITIONS

- A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.
- B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.
- C. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
- B. Samples: For each type of coating system and in each color and gloss of topcoat indicated.

1.4 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Contracting Officer will select one surface to represent surfaces and conditions for application of each coating system.
 - a. Other Items: Contracting Officer will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.

- a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Contracting Officer at no added cost to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide product described in generic terms in the Exterior High-Performance Coating Schedule for the coating category indicated.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
 - 3. Products shall be of same manufacturer for each coat in a coating system.
- C. Colors: As selected by Contracting Officer from manufacturer's full range, to match existing.

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 the Work.
- B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating 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 and coating systems indicated.

- B. Remove hardware, covers, plates, and similar items already in place that are removable and 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. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

3.3 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
- B. 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.

3.4 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

- A. Ungalvanized Steel Substrates:
 - 1. Pigmented Polyurethane over Epoxy Zinc-Rich Primer and High-Build Epoxy System MPI EXT 5.1G:
 - a. Prime Coat: Primer, zinc rich, epoxy, MPI #20.
 - b. Intermediate Coat: Epoxy, high build, low gloss, MPI #108.
 - c. First and Second Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6), MPI #72.
- B. Galvanized Steel Substrate:
 - 1. Pigmented Polyurethane over High-Build Epoxy System MPI EXT 5.1J:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal, MPI #101.
 - b. Intermediate Coat: Epoxy, high build, low gloss, MPI #108.
 - c. First and Second Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6), MPI #72.
- C. Stainless Steel Substrates:
 - 1. Pigmented Polyurethane over High-Build Epoxy System MPI EXT 5.1J:

- a. Prime Coat: Primer, epoxy, anti-corrosive, for metal, MPI #101.
- b. Intermediate Coat: Epoxy, high build, low gloss, MPI #108.
- c. First and Second Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6), MPI #72.

D. Ungalvanized Cast Iron Substrates:

- 1. Pigmented Polyurethane over Epoxy Zinc-Rich Primer and High-Build Epoxy System MPI EXT 5.1G:
 - a. Prime Coat: Primer, zinc rich, epoxy, MPI #20.
 - b. Intermediate Coat: Epoxy, high build, low gloss, MPI #108.
 - c. First and Second Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6), MPI #72.

E. Galvanized Cast Iron Substrate:

- 1. Pigmented Polyurethane over High-Build Epoxy System MPI EXT 5.1J:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal, MPI #101.
 - b. Intermediate Coat: Epoxy, high build, low gloss, MPI #108.
 - c. First and Second Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6), MPI #72.

END OF SECTION 099600

SECTION 230000 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 IMPOSED REGULATIONS:

- A. Applicable provisions of the State and Local Codes and of the following codes and standards in addition to those listed elsewhere in the specifications are hereby imposed on a general basis for mechanical work: codes and standards listed on the mechanical drawings.

1.2 SCOPE OF WORK:

- A. Provide all labor, materials, equipment and supervision to construct complete and operable mechanical systems as indicated on the drawings and specified herein. All materials and equipment used shall be new, undamaged and free from any defects.

1.3 RELATED DOCUMENTS AND OTHER INFORMATION:

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the portions of work specified in each and every Section of this Division, individually and collectively.
- B. It is recognized that separate sub-contracts may be instituted by THIS CONTRACT'S GENERAL CONTRACTOR with others. It is the responsibility of THIS CONTRACT'S GENERAL CONTRACTOR to completely inform, coordinate and advise those sub-contractors as to all of the requirements, conditions and information associated with providing and installing their portion of the total job.

1.4 EXISTING SERVICES AND FACILITIES:

- A. Damage to Existing Services: Existing services and facilities damaged by the Contractor through negligence or through use of faulty materials or workmanship shall be promptly repaired, replaced, or otherwise restored to previous conditions by the Contractor without additional cost to the Owner.
- B. Interruption of Services: Interruptions of services necessary for connection to or modification of existing systems or facilities shall occur only at prearranged times approved by the Owner. Interruptions shall only occur after the provision of all temporary work and the availability of adequate labor and materials will assure that the duration of the interruption will not exceed the time agreed upon.
- C. Removed Materials: Existing materials made unnecessary by the new installation shall be

stored on site. They shall remain the property of the Owner and shall be stored at a location and in a manner as directed by the Owner. If classified by the Owner's authorized representative as unsuitable for further use, the material shall become the property of the Contractor and shall be removed from the site at no additional cost to the owner.

1.5 PRODUCT WARRANTIES:

- A. Provide manufacturer's standard printed commitment in reference to a specific product and normal application, stating that certain acts of restitution will be performed for the Purchaser or Owner by the manufacturer, when and if the product fails within certain operational conditions and time limits. Where the warranty requirements of a specific specification section exceeds the manufacturer's standard warranty, the more stringent requirements will apply and modified manufacturer's warranty shall be provided. In no case shall the manufacturer's warranty be less than one (1) year.

1.6 PRODUCT SUBSTITUTIONS:

- A. General: Materials specified by manufacturer's name shall be used unless prior approval of an alternate is given by addenda. Requests for substitutions must be received in the office of the Contracting Officer at least 10 days prior to opening of bids. Refer to the general conditions for the substitution request form and required documentation.

PART 2 - PRODUCTS

2.1 GENERAL MECHANICAL PRODUCT REQUIREMENTS

- A. Standard Products: Provide not less (quality) than manufacturer's standard products, as specified by their published product data. In addition to the indication that a particular product/model number is acceptable, comply with the specified requirements. Do not assume that the available off-the-shelf condition of a product complies with the requirements; as an example, a specific finish or color may be required.
- B. Uniformity: Where multiple units of a general product are required for the mechanical work, provide identical products by the same manufacturer, without variations except for sizes and similar variations as indicated.
- C. Product Compatibility, Options: Where more than one product selection is specified, either generically or proprietarily, selection is Purchaser's or Installer's option. Provide mechanical adaptations as needed for interfacing of selected products in the work.
- D. Equipment Nameplates: Provide a permanent operational data nameplate on each item of power operated mechanical equipment, indicating the manufacturer, product name, model

number, serial number, speed, capacity, power characteristics, labels of tested compliance, and similar essential operating data.

- E. Locate nameplates in easy-to-read locations. When product is visually exposed in an occupied area of the building, locate nameplate in a concealed position (where possible) which is accessible for reading by service personnel.

PART 3 - EXECUTION

3.1 PRODUCT INSTALLATION, GENERAL:

- A. Except where more stringent requirements are indicated, comply with the product manufacturer's installation instructions and recommendations, including handling, anchorage, assembly, connections, cleaning and testing, charging, lubrication, startup, test operation and shut-down of operating equipment. Consult with manufacturer's technical experts, for specific instructions on unique product conditions and unforeseen problems.
- B. Protection and Identification: Deliver products to project properly identified with names, models numbers, types, grades, compliance labels and similar information needed for distinct identifications; adequately packaged or protected to prevent deterioration during shipment, storage and handling. Store in a dry, well ventilated, indoor space, except where prepared and protected by the manufacturer specifically for exterior storage.
- C. Permits and Tests: Provide labor, material and equipment to perform all tests required by the governing agencies and submit a record of all tests to the Owner or his representative. Notify the Contracting Officer five days in advance of any testing.
- D. Where components such as duct, pipe, conduit, etc. pass through non-fire-rated, interior partitions, fill void between component and opening in wall with fiberglass insulation and sealant for acoustical separation.

END OF SECTION

SECTION 230510 – MECHANICAL COORDINATION

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

- A. Mechanical Coordination Drawings: Prepare a set of coordination drawings showing the coordination of the major elements, components and systems of the mechanical work, and showing the coordination of mechanical work with other work. Prepare drawings at accurate scale and sufficiently large to show locations of every item, including clearances for installing, maintaining, insulating, breaking down equipment, replacing motors and similar requirements. Drawings shall indicate coordination with all other trades including, but not limited to, lighting, structural, and architectural items. Where applicable, existing conditions shall be accounted for. Prepare drawings to include plans, elevations, sections and details as needed to conclusively show successful coordination and integration of the work. Submit drawings for review by the Contracting Officer.

PART 2 - PRODUCTS

2.1 MECHANICAL PRODUCT COORDINATION

- A. Power Characteristics: Refer to the electrical sections of the specifications and the electrical drawings for the power characteristics available for the operation of each power driven item of mechanical equipment. The electrical design was based on the power requirements of the mechanical equipment manufacturer scheduled or specified as "basis of design." Any modifications to the electrical system that are required due to the use of an approved equivalent manufacturer shall be made at no additional cost to the owner. All changes must be clearly documented and submitted for review by the Contracting Officer prior to purchasing equipment. Coordinate purchases to ensure uniform interface with electrical work. Refer to specification Div. 26 for additional coordination requirements.
- B. Coordination of Options and Substitutions: When the contract documents permit the selection from several product options and it becomes necessary to authorize a substitution, do not proceed with purchase until coordination of interface to equipment has been checked and satisfactorily established.

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION

- A. Substrate Examination: The Installer of each element of the mechanical work must examine the condition of the substrate to receive the work, the conditions under which the work will be performed, and must notify the Contractor in writing of conditions detrimental to the proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- B. Do not proceed with the installation of sleeves, anchors, hangers, roof penetrations and similar work until mechanical coordination drawings have been processed and released for construction. Where work must be installed prior to that time in order to avoid a project delay, review proposed installation in a project coordination meeting including all parties involved with the interfacing of the work.

3.2 CUTTING AND PATCHING

- A. Structural Limitations: Do not cut structural framing, walls, floors, decks and other members intended to withstand stress, except with the Contracting Officer written authorization. Authorization will be granted only where there is not other reasonable method for completing the mechanical work, and where the proposed cutting clearly does not materially weaken the structure.
- B. Where authorized, cut opening through concrete (for pipe penetrations and similar services) by core drilling or sawing. Do not cut by hammer-driven chisel or drill.
- C. Other work: Do not endanger or damage other work through the procedures and processes of cutting to accommodate mechanical work. Review the proposed cutting with the Installer of the work to be cut and comply with his recommendations to minimize damage. Where necessary, engage the original Installer or other specialists to execute the cutting in the recommended manner.
- D. Where patching is required to restore other work, because of either cutting or other damage inflicted during the installation of mechanical work, execute the patching in the manner

recommended by the original Installer. Restore the other work in every respect, including the elimination of visual defects in exposed finishes, as judged by the Contracting Officer. Engage the original Installer to complete patching of the following categories of work:

1. Exposed concrete finishes.
2. Exposed masonry.
3. Waterproofing and vapor barriers.
4. Roofing, flashing and accessories.
5. Interior exposed finishes and casework, where judged by the Contracting Officer to be difficult to achieve an acceptable match by other means.

3.3 COORDINATION OF MECHANICAL INSTALLATION

- A. General: Sequence, coordinate and integrate the various elements of mechanical work so that the mechanical plant will perform as indicated and be in harmony with the other work of the building. The Architect/Engineer will not supervise the coordination, which is the exclusive responsibility of the Contractor. Comply with the following requirements:
- B. Install piping, ductwork and similar services straight and true, aligned with other work and with overhead structures and allowing for insulation. Conceal where possible.
- C. Arrange work to facilitate maintenance and repair or replacement of equipment. Locate services requiring maintenance on valves and similar units in front of services requiring less maintenance. Connect equipment for ease of disconnecting, with minimum of interference with other work.
- D. Drawings: Conform with the arrangement indicated by the contract documents to the greatest extent possible, recognizing that portions of the work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, comply with the Contracting Officer's decision on resolution of the conflict.
- E. Electrical Work: Coordinate the mechanical work with electrical work, and properly interface with the electrical service. In general, and except as otherwise indicated, install mechanical equipment ready for electrical connection. Refer to the electrical sections of the specifications for electrical connection of mechanical equipment.

- F. Utility Connections: Coordinate the connection of mechanical systems with exterior underground utilities and services. Comply with the requirements of governing regulations, franchised service companies and controlling agencies. Provide a single connection for each service except where multiple connections are indicated.

3.4 COORDINATION OF MECHANICAL START-UP

- A. Seasonal Requirements: Adjust and coordinate the timing of mechanical system start-ups with seasonal variations, so that demonstration and testing of specified performance can be observed and recorded. Exercise proper care in off-season start-ups to ensure that systems and equipment will not be damaged by the operation.
- B. Painting and Air Distribution: Coordinate the initial cleaning and start-up of the HVAC air distribution system, to occur prior to preparatory cleaning and general interior painting and decorating on the project.

END OF SECTION

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

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. Fastener systems.
 - 2. Equipment supports.
- B. Related Sections:
 - 1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
 - 2. Section 230548 "Vibration and Seismic Controls for HVAC" for vibration isolation devices.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Hangers and supports for HVAC equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - 1. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
 - 2. Design seismic-restraint hangers and supports for equipment and obtain approval from authorities having jurisdiction.

1.5 ACTION SUBMITTALS

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

- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:
 - 1. Equipment supports.
- C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Detail fabrication and assembly of trapeze hangers.
 - 2. Design Calculations: Calculate requirements for designing trapeze hangers.

1.6 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.7 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.2 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.3 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

- A. Fastener System Installation:
 - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 - 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- B. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- C. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- D. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

3.2 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and 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. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

- A. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

- A. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying equipment.
- B. Building Attachments: Unless otherwise indicated and, install the following types:
 1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 6. C-Clamps (MSS Type 23): For structural shapes.
 7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
 10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
 11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
 12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
 15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- C. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
 2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
 3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
 4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
 5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
 6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
 7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
 8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
 - a. Horizontal (MSS Type 54): Mounted horizontally.
 - b. Vertical (MSS Type 55): Mounted vertically.
 - c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
- D. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
- E. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION

SECTION 230548 - VIBRATION AND SEISMIC CONTROLS FOR HVAC

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. Elastomeric isolation pads.
 - 2. Elastomeric isolation mounts.
 - 3. Restrained elastomeric isolation mounts.
 - 4. Open-spring isolators.
 - 5. Housed-spring isolators.
 - 6. Restrained-spring isolators.
 - 7. Housed-restrained-spring isolators.
 - 8. Elastomeric hangers.
 - 9. Spring hangers.
 - 10. Snubbers.
 - 11. Restraint channel bracings.
 - 12. Restraint cables.
 - 13. Seismic-restraint accessories.
 - 14. Mechanical anchor bolts.
 - 15. Adhesive anchor bolts.
- B. Related Requirements:

1.3 DEFINITIONS

- A. IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.
- C. OSHPD: Office of Statewide Health Planning & Development (for the State of California).

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.

2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of vibration isolation device and seismic-restraint component required.
 - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction.
 - b. Annotate to indicate application of each product submitted and compliance with requirements.
 3. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.
- B. Shop Drawings:
1. Detail fabrication and assembly of equipment bases. Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
 2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
- C. Delegated-Design Submittal: For each vibration isolation and seismic-restraint device.
1. Include design calculations and details for selecting vibration isolators, seismic restraints, and vibration isolation bases complying with performance requirements, design criteria, and analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 2. Design Calculations: Calculate static and dynamic loading due to equipment weight, operation, and seismic and wind forces required to select vibration isolators and seismic and wind restraints and for designing vibration isolation bases.
 - a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show coordination of vibration isolation device installation and seismic bracing for HVAC equipment with other systems and equipment in the vicinity, including other supports and restraints, if any.
- B. Qualification Data: For professional engineer and testing agency.
- C. Welding certificates.
- D. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7 and that is acceptable to authorities having jurisdiction.
- B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are unavailable, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- 1. Unless specifically noted otherwise below, subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Ace Mountings Co., Inc.
 - b. California Dynamics Corporation.
 - c. Isolation Technology, Inc.
 - d. Kinetics Noise Control, Inc.
 - e. Mason Industries, Inc.
 - f. Vibration Eliminator Co., Inc.
 - g. Vibration Isolation.
 - h. Vibration Mountings & Controls, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. Wind-Restraint Loading:
 - 1. Basic Wind Speed: Refer to Structural documents.
 - 2. Building Classification Category: See Architectural
 - 3. Minimum 10 lb/sq. ft. multiplied by maximum area of HVAC component projected on vertical plane normal to wind direction, and 45 degrees either side of normal.
- B. Seismic-Restraint Loading:

1. Site Class as Defined in the IBC: See Structural
2. Assigned Seismic Use Group or Building Category as Defined in the IBC: See Structural.
 - a. Component Importance Factor: See Drawings.
3. Design Spectral Response Acceleration at Short Periods (0.2 Second): See Structural.
4. Design Spectral Response Acceleration at 1.0-Second Period: See Structural.
5. Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction.
 - a. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they are subjected.

2.3 ELASTOMERIC ISOLATION PADS

A. Elastomeric Isolation Pads.

1. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
2. Size: Factory or field cut to match requirements of supported equipment.
3. Pad Material: Oil and water resistant with elastomeric properties.
4. Surface Pattern: Smooth, Ribbed, or Waffle pattern.
5. Infused nonwoven cotton or synthetic fibers.
6. Load-bearing metal plates adhered to pads.
7. Sandwich-Core Material: Resilient and elastomeric .
 - a. Surface Pattern: Smooth, Ribbed, or Waffle pattern.
 - b. Infused nonwoven cotton or synthetic fibers.

2.4 ELASTOMERIC ISOLATION MOUNTS

A. Double-Deflection, Elastomeric Isolation Mounts.

1. Mounting Plates:
 - a. Top Plate: Encapsulated steel load transfer top plates, factory drilled and threaded with threaded studs or bolts.
 - b. Baseplate: Encapsulated steel bottom plates with holes provided for anchoring to support structure.
2. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.5 RESTRAINED ELASTOMERIC ISOLATION MOUNTS

1. Description: All-directional isolator with seismic restraints containing two separate and opposing elastomeric elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
 - a. Housing: Cast-ductile iron or welded steel.
 - b. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.6 OPEN-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators.

1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
5. Baseplates: Factory-drilled steel plate for bolting to structure with an elastomeric isolator pad attached to the underside. Baseplates shall limit floor load to 500 psig.
6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

2.7 HOUSED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators in Two-Part Telescoping Housing

1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
5. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators.
 - a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
 - b. Top housing with attachment and leveling bolt, threaded mounting holes and internal leveling device, or elastomeric pad.

2.8 RESTRAINED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators with Vertical-Limit Stop Restraint: .

1. Housing: Steel housing with vertical-limit stops to prevent spring extension due to weight being removed.
 - a. Base with holes for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
 - b. Top plate with elastomeric pad.
 - c. Internal leveling bolt that acts as blocking during installation.
2. Restraint: Limit stop as required for equipment and authorities having jurisdiction.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.9 HOUSED-RESTRAINED-SPRING ISOLATORS

- A. Freestanding, Steel, Open-Spring Isolators with Vertical-Limit Stop Restraint in Two-Part Telescoping Housing: .
 1. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators. Housings are equipped with adjustable snubbers to limit vertical movement.
 - a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
 - b. Threaded top housing with adjustment bolt and cap screw to fasten and level equipment.
 2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.10 ELASTOMERIC HANGERS

- A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods.
 1. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
 2. Dampening Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel to steel contact.

2.11 SPRING HANGERS

- A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression.
1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
 2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
 7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
 8. Self-centering hanger-rod cap to ensure concentricity between hanger rod and support spring coil.

2.12 SNUBBERS

- A. Description: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.
1. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
 2. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
 3. Maximum 1/4-inch air gap, and minimum 1/4-inch- thick resilient cushion.

2.13 RESTRAINT CHANNEL BRACINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Cooper B-Line, Inc.
 2. Hilti, Inc.
 3. Mason Industries, Inc.
 4. Unistrut.
- B. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

2.14 RESTRAINT CABLES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Kinetics Noise Control, Inc.
 - 2. Loos & Co., Inc.
 - 3. Vibration Mountings & Controls, Inc.
- B. Restraint Cables: ASTM A 492 stainless-steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with a minimum of two clamping bolts for cable engagement.

2.15 SEISMIC-RESTRAINT ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Cooper B-Line, Inc.
 - 2. Kinetics Noise Control, Inc.
 - 3. Mason Industries, Inc.
- B. Hanger-Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or Reinforcing steel angle clamped to hanger rod.
- C. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to rigid channel bracings and restraint cables.
- D. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.
- E. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.
- F. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

2.16 MECHANICAL ANCHOR BOLTS

- A. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

2.17 ADHESIVE ANCHOR BOLTS

- A. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing PVC or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and seismic- and wind-control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

- A. Hanger-Rod Stiffeners: Install hanger-rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
- B. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength is adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete.", Section 033053 "Miscellaneous Cast-in-Place Concrete."
- B. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.
- C. Equipment Restraints:
 - 1. Install seismic snubbers on HVAC equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.

2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
 3. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction that provides required submittals for component.
- D. Install cables so they do not bend across edges of adjacent equipment or building structure.
- E. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES, OSHPD, or an agency acceptable to authorities having jurisdiction that provides required submittals for component.
- F. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
- G. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- H. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- I. Drilled-in Anchors:
1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the Contract Officer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 5. Set anchors to manufacturer's recommended torque, using a torque wrench.
 6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Section 232113 "Hydronic Piping" for piping flexible connections.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 - 2. Schedule test with Owner, through Contract Officer, before connecting anchorage device to restrained component (unless post-connection testing has been approved), and with at least seven days' advance notice.
 - 3. Obtain Contract Officer's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 - 4. Test at least four of each type and size of installed anchors and fasteners selected by qualified professional engineer.
 - 5. Test to 90 percent of rated proof load of device.
 - 6. Measure isolator restraint clearance.
 - 7. Measure isolator deflection.
 - 8. Verify snubber minimum clearances.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Prepare test and inspection reports.

3.6 ADJUSTING

- A. Adjust limit stops on restrained-spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

3.7 VIBRATION ISOLATION EQUIPMENT BASES INSTALLATION

- A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete.", Section 033053, "Miscellaneous Cast-in-Place Concrete."

END OF SECTION

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

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. Equipment labels.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

1.4 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Plastic Labels for Equipment:
 - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick and having predrilled holes for attachment hardware.
 - 2. Letter Color: White
 - 3. Background Color: Black

4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 7. Fasteners: Stainless-steel rivets or self-tapping screws.
- B. Label Content: Include equipment's Drawing designation or unique equipment number, drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.
- C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

END OF SECTION

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

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. Balancing Air Systems:
 - a. Constant-volume air systems.

1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.

1.4 ACTION SUBMITTALS

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within 60 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- D. Certified TAB reports.
- E. Sample report forms.

F. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.6 QUALITY ASSURANCE

A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC, NEBB, or TABB..

1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC, NEBB, or TABB.
2. TAB Technician: Employee of the TAB contractor and who is certified by AABC, NEBB, or TABB as a TAB technician.

B. Certify TAB field data reports and perform the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

C. TAB Report Forms: Use standard TAB contractor's forms approved by Contracting Officer.

D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

E. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

F. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.7 PROJECT CONDITIONS

A. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.8 COORDINATION

A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

B. Perform TAB after leakage and pressure tests on air distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine equipment performance data including fan curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- G. Examine test reports specified in individual system and equipment Sections.
- H. Examine HVAC equipment and verify that bearings are greased, and equipment with functioning controls is ready for operation.
- I. Examine operating safety interlocks and controls on HVAC equipment.
- J. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:

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1. Permanent electrical-power wiring is complete.
2. Automatic temperature-control systems are operational.
3. Equipment and duct access doors are securely closed.
4. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", ASHRAE 111, NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems", SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.
 1. Comply with requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- B. Cut insulation, ducts, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
- C. Mark equipment and balancing devices, including damper-control positions, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations for airflow measurements.
- D. Check airflow patterns from the outdoor-air louvers and dampers through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check for airflow blockages

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow.
 - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
 - 2. Measure fan static pressures as follows to determine actual static pressure:
 - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
 - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 - 3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 - 4. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Measure air outlets and inlets without making adjustments.
 - 1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- C. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
 - 1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 - 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
 - 1. Manufacturer's name, model number, and serial number.

2. Motor horsepower rating.
3. Motor rpm.
4. Efficiency rating.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter thermal-protection-element rating.

- B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.7 TOLERANCES

- A. Set HVAC system's air flow rates within the following tolerances:
1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
 2. Air Outlets and Inlets: Plus or minus 10 percent.

3.8 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

3.9 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 2. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field-report data, include the following:
- 1.
 2. Fan curves.
 3. Manufacturers' test data.
 4. Field test reports prepared by system and equipment installers.
 5. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
 2. Name and address of the TAB contractor.
 3. Project name.
 4. Project location.
 5. Contracting Officer's name and address.
 6. Architect's name and address.
 7. Engineer's name and address.
 8. Contractor's name and address.
 9. Report date.
 10. Signature of TAB supervisor who certifies the report.
 11. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 12. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 13. Nomenclature sheets for each item of equipment.
 14. Data for terminal units, including manufacturer's name, type, size, and fittings.
 15. Notes to explain why certain final data in the body of reports vary from indicated values.
 16. Test conditions for fans performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of exhaust airflows.
- E. Fan Test Reports: For supply, return, and exhaust fans, include the following:
1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Center-to-center dimensions of sheave, and amount of adjustments in inches.

2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - g. Number, make, and size of belts.
3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.

F. Instrument Calibration Reports:

1. Report Data:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

G. Space Differential Pressure Reports:

1. Report Data
 - a. Provide differential pressures in all rooms indicated to have a positive or negative pressure relationship. Pressure relationship shall be ± 0.1 in. wg..

3.10 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
2. Check the following for each system:
 - a. Measure airflow of at least 10 percent of air outlets.
 - b. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
 - c. Verify that balancing devices are marked with final balance position.
 - d. Note deviations from the Contract Documents in the final report.

B. Final Inspection:

1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made, coordinate with Contracting Officer.
2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Contracting Officer.
3. Contracting Officer, Architect, or Engineer shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.

D. Prepare test and inspection reports.

3.11 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION

SECTION 233413 - HVAC FANS

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. In-line centrifugal fans.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, furnished specialties, and accessories for each fan.
 - 2. Certified fan performance curves with system operating conditions indicated.
 - 3. Certified fan sound-power ratings.
 - 4. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - 5. Material thickness and finishes, including color charts.
 - 6. Dampers, including housings, linkages, and operators.
 - 7. Fan speed controllers.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include diagrams for power, signal, and control wiring.
 - 4. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 - 5. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.
- C. Delegated-Design Submittal: For unit hangers and supports indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

- D. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show fan room layout and relationships between components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate and certify field measurements. Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
 - 1. Roof framing and support members relative to duct penetrations.
 - 2. Ceiling suspension assembly members.
 - 3. Ceiling-mounted items including light fixtures, grilles, speakers, access panels and special moldings.
- B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data:

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.
- C. UL Standards: Power ventilators shall comply with UL 705.

1.7 COORDINATION

- A. Coordinate size and location of structural-steel support members.
- B. Coordinate sizes and locations of equipment supports, and roof penetrations with actual equipment provided.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. AMCA Compliance:

1. Comply with AMCA performance requirements and bear the AMCA-Certified Ratings Seal.
 2. Operating Limits: Classify according to AMCA 99.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 IN-LINE CENTRIFUGAL FANS

- A. Housing: Split, spun aluminum with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting. Or Unibody die-cast construction.
- B. Direct-Drive Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing.
- C. Fan Wheels: Aluminum or steel, airfoil blades welded to aluminum hub.
- D. Accessories:
1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 2. Fan Guards: 1/2- by 1-inch mesh of galvanized steel in removable frame. Provide guard for inlet or outlet for units not connected to ductwork.

2.3 MOTORS

- A. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
- B. Enclosure Type: Totally enclosed, fan cooled.

2.4 SOURCE QUALITY CONTROL

- A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210/ASHRAE 51, "Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install fans level and plumb, see construction documents.
- B. Disassemble and reassemble units, as required for moving to the final location, according to manufacturer's written instructions.
- C. Lift and support units with manufacturer's designated lifting or supporting points.
- D. Equipment Mounting:
 - 1. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."
- E. Ceiling Units: Suspend units from structure; see construction documents.
- F. Install units with clearances for service and maintenance.
- G. Label fans according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."
- H. Unit Support: Install centrifugal fans level on structural. Coordinate wall penetrations and flashing with wall construction.

3.2 CONNECTIONS

- A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. Install ducts adjacent to fans to allow service and maintenance.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform the following tests and inspections
 - 1. Verify that shipping, blocking, and bracing are removed.
 - 2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - 3. Verify that cleaning and adjusting are complete.

4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system.
 5. Verify lubrication for bearings and other moving parts.
 6. Remove and replace malfunctioning units and retest as specified above.
- D. Test and adjust controls and safeties. Controls and equipment will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.4 ADJUSTING

- A. Lubricate bearings.
- B. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.

END OF SECTION

SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES

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. Louvers.
- B. Related Sections:
 - 1. Section 089116 "Operable Wall Louvers" and Section 089119 "Fixed Louvers" for fixed and adjustable louvers and wall vents, whether or not they are connected to ducts.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, include the following:
 - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
 - 2. Louver Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
 - 1. Method of attaching hangers to building structure.
- B. Source quality-control reports.

PART 2 - PRODUCTS

- 2.1 Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on drawings or equal.
- 2.2 Refer to drawings

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where louvers are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install louvers level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of louvers. Make final locations where indicated, as much as practical. Where architectural features or other items conflict with installation, notify Contracting Officer for a determination of final location.
- C. Install louvers per manufacturer recommendations.

3.3 ADJUSTING

- A. After installation, adjust louvers indicated, or as directed, before starting air balancing.

END OF SECTION

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 IMPOSED REGULATIONS

- A. Applicable provisions of the State and Local Codes and of the following codes and standards in addition to those listed elsewhere in the specifications are hereby imposed on a general basis for electrical work: codes and standards listed on the electrical drawings.

1.2 SCOPE OF WORK

- A. Provide all labor, materials, equipment and supervision to construct complete and operable electrical systems as indicated on the drawings and specified herein. All materials and equipment used shall be new, undamaged and free from any defects.

1.3 RELATED DOCUMENTS AND OTHER INFORMATION

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the portions of work specified in each and every Section of this Division, individually and collectively.

1.4 EXISTING SERVICES AND FACILITIES

- A. Damage to Existing Services: Existing services and facilities damaged by the Contractor through negligence or through use of faulty materials or workmanship shall be promptly repaired, replaced, or otherwise restored to previous conditions by the Contractor without additional cost to the Owner.
- B. Interruption of Services: Interruptions of services necessary for connection to or modification of existing systems or facilities shall occur only at prearranged times approved by the Owner. Interruptions shall only occur after the provision of all temporary work and the availability of adequate labor and materials will assure that the duration of the interruption will not exceed the time agreed upon.
- C. Removed Materials: Existing materials made unnecessary by the new installation shall be stored on site. They shall remain the property of the Owner and shall be stored at a location and in a manner as directed by the Owner. If classified by the Owner's authorized representative as unsuitable for further use, the material shall become the property of the Contractor and shall be removed from the site at no additional cost to the owner.

1.5 PRODUCT WARRANTIES

- A. Provide manufacturer's standard printed commitment in reference to a specific product and normal application, stating that certain acts of restitution will be performed for the Purchaser or Owner by the manufacturer, when and if the product fails within certain operational conditions and time limits. Where the warranty requirements of a specific specification section exceed the manufacturer's standard warranty, the more stringent requirements will apply and modified manufacturer's warranty shall be provided. In no case shall the manufacturer's warranty be less than one (1) year.

1.6 PRODUCT SUBSTITUTIONS

- A. General: Materials specified by manufacturer's name shall be used unless prior approval of an alternate is given by addenda. Requests for substitutions must be received in the office of the Contracting Officer at least 10 days prior to opening of bids.

1.7 ELECTRICAL DRAWINGS

- A. Electrical contract drawings are diagrammatic and indicate the general arrangement of electrical equipment. Do not scale electrical plans. Obtain all dimensions from the Architect's dimensioned drawings and field measurements. The Contractor shall review Architectural plans for door swings and built-in equipment; conditions indicated on those plans shall govern for this work.
- B. Coordinate installation of electrical equipment with the structural and mechanical equipment and access thereto. Coordinate exterior electrical work with civil and landscaping work.
- C. Discrepancies shown on different drawings, between drawings and specifications or between documents and field conditions shall be installed to provide the better quality or greater quantity of work; or, comply with the more stringent requirement; either or both in accordance with the A/E's interpretation.

1.8 SYSTEMS REQUIRING ROUGH-IN

- A. Rough-in shall consist of all outlet boxes/raceway systems/supports and sleeves required for the installation of cables/devices by other Divisions and by the Owner. It shall be the responsibility of this Contractor to determine the requirements by reviewing the contract documents and meeting with the Superintendent of the trade involved and Owner's representative to review submittal data, shop drawings, etc.

1.9 SUBMITTALS

- A. Refer to section 260510

PART 2 - EXECUTION

2.1 PRODUCT INSTALLATION, GENERAL

- A. Except where more stringent requirements are indicated, comply with the product manufacturer's installation instructions and recommendations, including handling, anchorage, assembly, connections, cleaning and testing, charging, lubrication, startup, test operation and shut-down of operating equipment. Consult with manufacturer's technical experts, for specific instructions on unique product conditions and unforeseen problems.
- B. Protection and Identification: Deliver products to project properly identified with names, models numbers, types, grades, compliance labels and similar information needed for distinct identifications; adequately packaged or protected to prevent deterioration during shipment, storage and handling. Store in a dry, well ventilated, indoor space, except where prepared and protected by the manufacturer specifically for exterior storage.

- C. Permits and Tests: Provide labor, material and equipment to perform all tests required by the governing agencies and submit a record of all tests to the Owner or his representative. Notify the Contracting Officer five days in advance of any testing.
- D. Install temporary protective covers over equipment enclosures, outlet boxes and similar items after interiors, conductors, devices, etc. are installed, to prevent the entry of construction debris and to protect the installation during finish work performed by others. Do not install device plates, equipment covers or trims until finish work is complete.
- E. Clean all equipment, inside and out, upon completion of the work. Scratched or marred surfaces shall be touched-up with touch-up paint furnished by the equipment manufacturer.
- F. Replace all equipment and materials that become damaged.
- G. No more than three phase conductors, each of opposite phases for a three phase WYE system, shall be combined in a single raceway unless written approval is granted by the engineer or noted otherwise on the construction documents. (For 120 volt and 277 volt receptacle and lighting circuits are no more than 3 circuits unless written approval is granted by the engineer or noted otherwise on the construction documents.)

2.2 EQUIPMENT PROTECTION

- A. Equipment and materials shall be protected during shipment and storage against physical damage, vermin, dirt, corrosive substances, fumes, moisture, cold and rain.
- B. Store equipment indoors in clean dry space with uniform temperature to prevent condensation. Equipment shall include but not be limited to switchgear, switchboards, panelboards, transformers, motor control centers, motor controllers, uninterruptible power systems, enclosures, controllers, circuit protective devices, cables, wire, light fixtures, electronic equipment, and accessories.
- C. During installation, equipment shall be protected against entry of foreign matter; and be vacuum-cleaned both inside and outside before testing and operating. Compressed air shall not be used to clean equipment. Remove loose packing and flammable materials from inside equipment.
- D. Damaged equipment shall be, as determined by the Engineer, placed in first class operating condition or be returned to the source of supply for repair or replacement.
- E. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.

- F. Damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

2.3 ELECTRICAL WORK

- A. Electrical work shall be accomplished with all affected circuits or equipment de-energized.
- B. Nothing in the above shall impose any duty on the Architects and Architect's consultants, nor relieve the General Contractor and its subcontractors of its obligations, duties and responsibilities including but not limited to, construction means, methods, sequence, techniques or procedures necessary for performing, superintending and coordinating the Electrical Work in accordance with the Contract Documents and any health or safety precautions required by any regulatory agencies.

END OF SECTION

SECTION 260501 - ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.1 Not Used

PART 2 - PRODUCTS

2.1 Not Used

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Field verify measurements and circuiting arrangements are as shown on Drawings.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition drawings are based on casual field observation.
- D. Report discrepancies to Contracting Officer before disturbing existing installation.
- E. Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

- A. Disconnect electrical systems in walls, and floors to be removed.
- B. Provide temporary wiring and connections to maintain existing systems in service during construction.
- C. When work must be performed on energized equipment or circuits, use personnel experienced in such operations, submit verification of compliance with the contractor's safety procedures to the Contracting Officer, and notify the Owner in writing a minimum of 24 hours prior to work.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Maintain electrical service to areas outside of the construction area.
- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned wiring to source of supply.
- D. Remove exposed abandoned. Cut conduit flush with walls and floors, and patch surfaces.
- E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

- F. Disconnect and remove electrical devices and equipment serving utilization equipment that

has been removed.

- G. Disconnect and remove abandoned luminaries. Remove brackets, stems, hangers, and other accessories.
- H. Repair adjacent construction and finishes damaged during demolition and extension work.
- I. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- J. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.
- K. All demolished ballasts and lamps shall be recycled.
- L. Remove all abandoned conductors and cables within the construction area.

3.4 CONSTRUCTION PHASING

- A. Plan and execute the work in accordance with the construction phasing indicated on the Architectural plans. Test and certify all systems, by phase of construction, so that "partial occupancy" can be obtained.

3.5 REUSE OF EXISTING MATERIALS

- A. Where new devices are to replace existing, it shall be permissible to reuse existing outlet boxes and branch circuit conduits. It shall be the responsibility of the Contractor to ensure that existing outlet boxes and conduits that are reused comply with requirements for new.
- B. The reuse of conduits (not remaining in place), conductors, and devices is not permitted.

3.6 CUTTING AND PATCHING

- A. Structural Limitations: Do not cut structural framing, walls, floors, decks, and other members intended to withstand stress, except with the Engineer's written authorization. Authorization will be granted only when there is no other reasonable method for completing the electrical work, and where the proposed cutting clearly does not materially weaken the structure.
- B. Cutting Concrete: Where authorized, cut openings through concrete (for conduit penetrations and similar services) by core drilling or sawing. Do not cut by hammer-driven chisel or drill. Prior to cutting of existing concrete walls, floors, or ceilings x-ray existing concrete to locate existing hidden utilities.
- C. Other Work: Do not endanger or damage other work through the procedures and process of cutting to accommodate electrical work. Review the proposed cutting with the Installer of the work to be cut, and comply with his recommendations to minimize damage. Where necessary, engage the original Installer or other specialists to execute the cutting in the recommended manner.
- D. Patching: Where patching is required to restore other work, because of cutting or other damage inflicted during the installation of electrical work, execute the patching in the manner

recommended by the original Installer. Restore the other work in every respect, including the elimination of visual defects in exposed finished, as judged by the Engineer. Engage the original Installer to complete patching of various categories of work including: concrete and masonry finishing, waterproofing and roofing, exposed wall finishes, etc.

3.7 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment that remain or that are to be reused.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions.

3.8 LABELING

- A. Provide typed circuit directory showing revised circuiting arrangement.
- B. Provide and install a new engraved nameplate for all electrical panels that have been modified during construction. Refer to the panelboard specification section for labeling requirements.

END OF SECTION

SECTION 260510 – ELECTRICAL SUBMITTALS

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- A. Comply with the applicable requirements of the Division 1 specifications (013300) and the requirements of this Division of the specifications.

1.2 SUBMITTALS

- A. Submit for review by the Engineer Architect a schedule with engineering data of materials and equipment to be incorporated in the work. Submittals shall be supported by descriptive materials, i.e., catalog sheets, product data sheets, diagrams, performance curves and charts published by the manufacturer, warranties, etc., to show conformance to Specifications and Plan requirements; model numbers alone shall not be acceptable. Data submitted for review shall contain all information to indicate compliance with Contract Documents. Complete electrical characteristics shall be provided for all equipment. Submittals for lighting fixtures shall include Photometric Data. The Engineer reserves the right to require samples of any equipment to be submitted for review.
- B. The purpose of shop drawing review is to demonstrate to the Architect that the Contractor understands the design concept. The Architect's review of such drawings, schedules, or cuts shall not relieve the Contractor from responsibility for deviations from the drawings or specifications unless he has, in writing, called the Architect's attention to such deviation at the time of submission, and received written permission from the Architect for such deviations.
- C. Where cut sheets include an entire product family, mark all specific items to be utilized for this project on equipment cut sheets. Generic cut sheets with no indication of which items on the cut sheet shall be used will be rejected.
- D. Response to Submittals: Shop drawings shall be returned by the Electrical Engineer with the following classifications:
 - 1. "No Exceptions Taken": No corrections, no marks. Contractor shall submit copies for distribution
 - 2. "Make Corrections Noted": A few minor corrections. Items may be ordered as marked up without further resubmission. Submit copies for distribution.
 - 3. "Amend and Resubmit": Minor corrections. Item may be ordered at the Contractor's risk. Contractor shall resubmit drawings with corrections noted.
 - 4. "Rejected - Resubmit": Major corrections or not in accordance with the contract documents. No items shall be ordered. Contractor shall correct and resubmit drawings.
- E. Prior Approvals and Shop Drawings must be hand delivered, received by mail, or email.
- F. Equipment and materials requiring submittals:
 - 1. Section 260500 – Common Work Results for Electrical

- a. Product Warranties
- 2. Section 260511 – Electrical Work Closeout
 - a. Record Drawings
 - b. Record Manuals
 - c. Close out submittals
- 3. Section 260519 – Low-Voltage Electrical Conductors and Cables
 - a. Product Data
- 4. Section 260526 –Bonding for Electrical Systems
 - a. Product Data
- 5. Section 260529 – Hangers and Supports for Electrical Systems
 - a. Product Data
- 6. Section 260533 – Raceway and Boxes for Electrical Systems
 - a. Raceway
 - b. Boxes
 - c. Enclosure ratings
- 7. Section 260548 – Vibration and Seismic Controls for Electrical Systems
 - a. Submit seismic force level (Fp) calculations from applicable building code.
 - b. Submit pre-approved restraint selections and installation details
 - c. Restraint selection and installation details shall be sealed by a professionally licensed engineer experienced in seismic restraint design.
 - d. Submit manufacturer's product data on strut channels including, but not limited to, types, materials, finishes, gauge thickness, and hole patterns. For each different strut cross-section, submit cross sectional properties including Section Modulus (Sx) and Moment of Inertia (Ix).
 - e. Field reports
- 8. Section 260553 – Identification for Electrical Systems
 - a. Product data for all labeling products
- 9. Section 262726 – Wiring Devices
 - a. Product data
 - b. Device Plates
 - c. Weatherproof Covers
 - d. Device and device plate colors
- 10. Section 264100 – Facility Lightning Protection
 - a. Lightning Protection System Components
 - b. Layout drawing including all bonding of metal bodies
 - c. Installation Details
 - d. Coordination Letter from Roofing Contractor / Roof Supports and Penetrations
 - e. Installer Qualifications
 - f. U.L. Masterlabel Certification
 - g. Submit shop drawings to indicate information not fully described by the product data to indicate compliance with the contract drawings. Include layout indicating all system components and interconnection with each component identified for

this project. Typical layouts are not acceptable. Prepare drawing at a minimum scale of 1/16"=1'-0".

- h. Review shop drawings submitted under this and other sections, as well as other divisions, to ensure coordination between work required among different trades. Coordinate the installation sequence with other Contractors to avoid conflicts and to provide the fastest overall installation schedule. Coordinate installation with architectural and structural features, equipment installed under other sections of the specifications and electrical equipment to insure access.
- i. Provide a separate letter to the Roofing manufacturer requesting method of attaching materials to and penetrating roof, for each type roof. Engage the services of the roof installer to provide attaching materials and to make and seal all roof penetrations.
- j. Comply with UL 96A, "Master Labeled Lightning Protection Systems"

11. Section 265100 – Lighting

- a. Lighting Fixtures
- b. Emergency Ballasts

PART 2 - PRODUCTS

2.1 Not Used.

PART 3 - EXECUTION

3.1 MANUFACTURER'S DATA

- A. Include the manufacturer's comprehensive product data sheet and installation instructions. Where operating ranges are shown, mark data to show portion of range required for project application. Where pre-printed data sheet covers more than one distinct product-size, type, material, trim, accessory group or other variations, delete or mark-out portions of the pre-printed data which are not applicable.

3.2 EQUIPMENT LIST

- A. Where more than one type of a product is being used (i.e. starters, disconnects, breakers, etc.) provide a list with each submittal correlating the type and size of product to the load served.

3.3 TEST REPORTS

- A. Submit test reports which have been signed and dated by the firm performing the tests, and prepare in the manner specified in the standard or regulation governing the tests procedure as indicated.

END OF SECTION

SECTION 260511 - ELECTRICAL WORK CLOSEOUT

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Refer to section 260510.

1.2 RELATED SECTIONS

- A. Refer to section 017839 for additional requirements.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Except where otherwise indicated, electrical drawings prepared by Engineer are diagrammatic in nature and may not show locations accurately for various components of electrical system. Shop drawings, including coordination drawings, prepared by the Contractor show portions of work more accurately to scale and location, and in greater detail. It is recognized that actual layout of installed work may vary substantially from both Contractor drawings and shop drawings.
- B. The electrical superintendent shall maintain a white set of contract documents and shop drawings in clean, undamaged condition, for mark-up of actual installations which vary substantially from the work as shown. PDF or digital mark-ups is acceptable alternates Mark-up whatever drawings are most capable of showing installed conditions accurately. However, where shop drawings are marked, record a reference note on appropriate contract drawings. Mark with erasable pencil, and use multiple colors to aid in the distinction between work of separate electrical systems. These documents shall be used for no other purpose. In general, record every substantive installation of electrical work which previously is either not shown or shown inaccurately, but in any case record the following:
 - 1. Post all addenda prior to beginning work.
 - 2. Underground feeder conduits, both interior and exterior, drawn to scale and fully dimensioned.
 - 3. Work concealed behind or within other work, in a non-accessible arrangement.
 - 4. Mains and branches of wiring systems, with panelboards and control devices located and numbered, with concealed splices located, and with devices requiring maintenance located.
 - 5. Scope of each change order (C.O.), noting C.O. number.
- C. Upon each visit by the Architect/Engineer, the Contractor shall demonstrate that the record documents are being kept current, as specified hereinbefore.

2.2 RECORD MANUALS

- A. Record manuals shall include the following:
 - 1. Manufacturer's operation and maintenance manuals for:
 - a. Light Fixtures
 - b. Circuit Breakers
 - c. Surge Protection Devices

d. Lightning Protection System

2. Shop drawings, revised to reflect all review comments, supplemented with the installation instructions shipped with equipment.
3. One copy of all panelboard directories.
4. All field test Reports
5. Electrical Contractor's Warranty

- B. Submit record manuals in quantities and in the format prescribed in the Division 1 specifications.

2.3 CLOSEOUT SUBMITTALS

- A. Software and Firmware Operational Documentation:
1. Software operating and upgrade manuals.
 2. Program Software Backup: On USB drive, complete with data files.
 3. Device address list.
 4. Printout of software application and graphic screens.

PART 3 - EXECUTION

3.1 SITE VISITS

- A. At all construction observations by the Architect/Engineer, the Contractor shall demonstrate to the Architect/ Engineer that all work is complete in accordance with the contract documents and that all systems have been tested and are fully operational. The Contractor

shall furnish the personnel, tools and equipment required to inspect and test all systems.

END OF SECTION

SECTION 260519 – LOW-VOLTAGE ELECTRICAL CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the requirements for the following:
 - 1. Wire and cable for 600 volts and less.
 - 2. Wiring connectors and connections.

1.2 SUBMITTALS

- A. Refer to section 260510.

1.3 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.4 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; current edition.
- B. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; current edition.
- C. NFPA 70 - National Electrical Code; National Fire Protection Association, current edition.

PART 2 - PRODUCTS

2.1 WIRING REQUIREMENTS

- A. Concealed Dry Interior Locations: Use only THHN-2, THWN-2 or XHHW-2 wire in raceway.
- B. Exposed Dry Interior Locations: Use only THHN-2, THWN-2, or XHHW-2 in raceway.
- C. Wet or Damp Interior Locations: Use only THWN-2 or XHHW-2 in raceway.
- D. Exterior locations (above or below grade) THWN-2, XHHW-2 or USE in raceway.
- E. Use conductors not smaller than 12 AWG for power and lighting circuits.
- F. Use conductors not smaller than 14 AWG for control circuits.

- G. Metal Clad (MC) cable shall not be used unless prior approval has been granted by the architect and engineer.

2.2 BUILDING WIRE

- A. Conductor: Copper.
- B. Insulation Voltage Rating: 600 volts.
- C. Temperature Rating: 90°C.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Pull all conductors into raceway at same time.
- B. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
- C. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- D. Clean conductor surfaces before installing lugs and connectors.
- E. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- F. Use split bolt connectors or compression fittings for splices and taps on conductors 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
- G. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
- H. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
- I. Tighten electrical connectors and terminals according to manufacturer's published torque-

tightening values or UL 486A and UL 486B.

- J. Identify and color code wire and cable under provisions of Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.
- K. For each electrical connection/termination, provide a complete assembly of materials, including but not necessarily limited to, pressure connectors, terminals (lugs), electrical insulating tape, heat-shrinkable insulating tubing, cable ties, solderless wire nuts, and other materials necessary to complete splices and terminations. Torque all connections according to installation instructions.
- L. Motor connections shall be made with compression connectors forming a bolted in-line or stub-type connection.
- M. All splices made underground or in the pipe basements shall be rated suitable for water immersion.
- N. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

3.2 LABELING

A. Color Coding

- 1. The color of the circuit conductors shall be as follows:

120/240 volt, 1-phase	Phase A - Black
	Phase B - Red
	Neutral - White

3.3 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA STD ATS, except Section 4.
- B. Perform inspections and tests listed in NETA STD ATS, Section 7.3.2.

END OF SECTION

SECTION 260526 –BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Bonding components.

1.2 SUBMITTALS

- A. Refer to section 260510.

1.3 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.4 REFERENCES

- A. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; current edition.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; current edition.
- C. NFPA 99 - Standard for Health Care Facilities; National Fire Protection Association; current edition.
- D. IEEE Standard 142 “Green Book” – Recommended Practices for Grounding of industrial and Commercial Power Systems; current edition.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Bonding Jumper Braid: Copper braided tape, sized for application.
- B. Electrical Grounding conductors: Unless otherwise indicated, provide bare or green insulated stranded copper electrical grounding conductors sized according to NEC or as shown or specified. Provide green insulated for conductors sized No. 10 AWG and smaller.

2.2 GROUND CONNECTIONS

- A. Above Grade:
 - 1. Bonding Jumpers: compression type connectors, using zinc-plated fasteners and external tooth lock washers.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions prior to beginning work.

3.2 LIGHTNING PROTECTION SYSTEM

- A. Bond the lightning protection system to the electrical grounding electrode system.

3.3 CONDUCTIVE PIPING

- A. Bond all conductive piping systems (excluding fuel gas piping), interior and exterior, to the building to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.
- B. Install braided type bonding jumpers with ground clamps on water meter piping to electrically bypass meter where the main is metallic on both sides of the meter. Install clamp-on connectors only on thoroughly cleaned metal contact surfaces, to ensure electrical conductivity and circuit integrity.

3.4 CORROSION INHIBITORS

- A. When making ground and ground bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

3.5 SECONDARY EQUIPMENT AND CIRCUITS

- A. Panelboards, Disconnects; Connect metallic conduits, which terminate without mechanical connection to the housing, by grounding bushings and grounding conductor to the equipment ground bus.
- B. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders and power and lighting branch circuits, sized in accordance with Article 250 of NFPA 70.
- C. Boxes, Cabinets, Enclosures, and Panelboards:

1. Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes (except for special grounding systems for intensive care units and other critical units shown).
 2. Provide lugs in each box and enclosure for equipment grounding conductor termination.
 3. Provide ground bars in panelboards, bolted to the housing, with sufficient lugs to terminate the equipment grounding conductors.
- D. Motors and Starters: Provide lugs in motor terminal box and starter housing or motor control center compartment to terminate equipment grounding conductors.
- E. Receptacles shall not be grounded through their mounting screws. Ground with a jumper from the receptacle green ground terminal to the device box ground screw and the branch circuit equipment grounding conductor.
- F. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.
- G. Metallic Conduit: Metallic conduits which terminate without mechanical connection to an electrical equipment housing by means of locknut and bushings or adapters, shall be provided

with grounding bushings. Connect bushings with a bare grounding conductor to the equipment ground bus.

3.6 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA STD ATS except Section 4.
- B. Perform inspections and tests listed in NETA STD ATS, Section 7.13.
- C. Upon completion of installation of electrical grounding system, test resistance of each ground rod installation using the "Fall of Potential" method. Ground resistances shall be measured in normally dry conditions not less than 48 hours after rainfall and at low tide. Where tests show resistance to ground is over the specified value, take appropriate action to reduce resistance by driving additional sections of ground rods and then retest to demonstrate compliance. Tests shall be conducted in the presence of the Project Electrical Engineer. Provide forms to record the data as the tests are conducted. Forms shall be signed by the person conducting the test and included with project closeout documents.

END OF SECTION

SECTION 260529 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the requirements for the following:
 - 1. Conduit and equipment supports.
 - 2. Anchors and fasteners.

1.2 SUBMITTALS

- A. Refer to section 260510.

1.3 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.4 REFERENCE STANDARDS

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; current edition.

PART 2 - PRODUCTS.

2.1 MATERIALS

- A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant stainless steel materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.
- B. Supports: Fabricated of structural steel or formed steel members; stainless steel, or PVC.
- C. Anchors and Fasteners:
 - 1. Do not use powder-actuated anchors.
 - 2. Concrete Structural Elements: Use precast inserts, expansion anchors, or preset inserts.
 - 3. Steel Structural Elements: Use beam clamps, stainless steel spring clips, stainless steel ramset fasteners, or welded fasteners.
 - 4. Concrete Surfaces: Use self-drilling stainless steel anchors or stainless steel expansion anchors.
 - 5. Solid Masonry Walls: Use stainless steel expansion anchors or preset inserts.
 - 6. Sheet Metal: Use stainless steel sheet metal screws.
 - 7. Wood Elements: Use stainless steel wood screws.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
 - 1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
- B. Cutting or Holes:
 - 1. Locate holes in advance where they are proposed in the structural sections such as ribs or beams. Obtain the approval of the Contracting Officer prior to drilling through structural sections.
 - 2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted by the Contracting Officer as required by limited working space.
- C. Rigidly weld support members or use stainless steel hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- D. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- E. In wet and damp locations use stainless steel channel supports to stand cabinets, disconnects and panelboards 1 inch (25 mm) off wall.
- F. Use stainless steel sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.
- G. Do not fasten boxes to ceiling support wires.
- H. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.
- I. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- J. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.
- K. Do not support conduit with wire, wire ties, or perforated pipe straps. Remove wire used for temporary supports.

END OF SECTION

SECTION 260533 – RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Refer to section 260510

1.2 QUALITY ASSURANCE

- A. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

1.3 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); current edition
- B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); current edition
- C. ANSI C80.5 - American National Standard for Electrical Rigid Aluminum Conduit (ERAC); current edition
- D. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; current edition
- E. NECA 101 - Standard for Installing Steel Conduit (Rigid, IMC, EMT); National Electrical Contractors Association; current edition
- F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; current edition

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Accept conduit on site. Inspect for damage
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

PART 2 - PRODUCTS

2.1 CONDUIT REQUIREMENTS

- A. Conduit Size: Comply with NFPA 70.
 - 1. Minimum Size: 3/4 inch
- B. Wet and Damp Locations:
 - 1. Exterior above ground and in pipe basements: RNC schedule 40, or LFMC (LFMC shall be only used with restrictions, see conduit installation)

2. Exterior below ground: RNC schedule 40
 3. Interior: RNC schedule 40, or LFMC (LFMC shall be only used with restrictions, see conduit installation)
 4. Interior below grade: RNC schedule 40
- C. Dry Locations:
1. Concealed: RNC schedule 40, or LFMC (LFMC shall be only used with restrictions, see conduit installation)
 2. Exposed: RNC schedule 40, or LFMC (LFMC shall be only used with restrictions, see conduit installation)
 3. Interior below grade: RNC schedule 40
- D. Area subject to physical damage: RNC schedule 40, or LFMC (LFMC shall be only used with restrictions, see conduit installation)
1. "Areas subject to physical damage" shall be defined as the most stringent of the following:
 - a. Exposed conduit below eight feet above finished floor.
 - b. As interpreted by the authority having jurisdiction (AHJ).
- 2.2 LIQUIDTIGHT FLEXIBLE METAL CONDUIT
- A. LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC) Description: Interlocked steel construction with PVC jacket. Liquid-tight flexible metal conduit: Shall Conform to UL 360.
- B. Fittings: UL 514B and ANSI/ NEMA FB1.
1. Only steel or malleable iron materials are acceptable.
 2. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are prohibited.
 3. Fittings must incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.
 4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch, with overlapping sleeves protecting threaded joints.
- 2.3 NONMETALLIC CONDUIT
- A. RIGID NONMETALLIC CONDUIT (RNC): Direct burial plastic conduit: Shall conform to UL 651 and UL 651A, heavy wall PVC or high density polyethylene (PE).
- B. RNC: NEMA TC 2, schedule 40 PVC
- C. Fittings shall meet the requirements of UL 514C and NEMA TC3
- D. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material.
- 2.4 EXPANSION AND DEFLECTION COUPLINGS

- A. Conform to UL 467 and UL 514B.
- B. Accommodate, 0.75 inch deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.
- C. Include internal flexible metal braid sized to guarantee conduit ground continuity and fault currents in accordance with UL 467, and the NEC code tables for ground conductors.
- D. Jacket: Flexible, corrosion resistant, watertight, moisture and heat resistant molded rubber material with stainless steel jacket clamps.

2.5 CORROSION PROTECTION

- A. Corrosion protection for conduits passing through concrete slabs shall be by one of the following means: field-wrapped with 3M Scotchrap No. 50, 2-inch wide (minimum), with a 50 percent overlay, or shall have a factory-applied polyvinyl chloride, plastic resin, or epoxy coating.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify routing and termination locations of conduit prior to rough-in.
- B. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to provide a complete wiring system.

3.2 CONDUIT INSTALLATION

- A. Install conduit securely, in a neat and workmanlike manner, as specified in NECA 101.
- B. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal clearances around the conduit and make watertight.
- C. Arrange supports to prevent misalignment during wiring installation.
- D. Arrange conduit to maintain headroom and present neat appearance.
- E. Route exposed conduit parallel and perpendicular to walls or align with stair spiral.
- F. Route conduit in and under slab from point-to-point.
- G. Maintain adequate clearance between conduit and piping.
- H. Maintain 12 inch (300 mm) clearance between conduit and surfaces with temperatures exceeding 104 degrees F (40 degrees C).
- I. Cut conduit square using saw or pipecutter; de-burr cut ends.
- J. Bring conduit to shoulder of fittings; fasten securely.

- K. For power conduits install no more than equivalent of three 90 degree bends between boxes. Use conduit benders to make sharp changes in direction, as around beams. Use hydraulic one shot bender to fabricate bends in metal conduit larger than 2 inch (50 mm) size.
- L. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- M. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic, control, and expansion joints.
- N. Seal the inside of all conduits where conduit passes below floor or outside of the building.
- O. Provide suitable pull string in each empty conduit except sleeves and nipples.
- P. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- Q. Do not install LFMC in lengths over 6'.
- R. Use LFMC only to connect to equipment subject to vibration or to suspended light fixtures.
- S. Wherever possible, install horizontal raceway runs above water and drain piping. Give the right-of-way in confined spaces to piping that must slope for drainage and to larger HVAC ductwork and similar services that are less conformable than electrical services.
- T. Complete the installation of electrical raceways before starting installation of cables within raceways.
- U. Raceways shall not be installed exposed in finished spaces. Install concealed in walls, ceilings, below slab-on-grade or embedded in slabs above grade.

3.3 BOX INSTALLATION

- A. Boxes for Concealed Conduits:
 - 1. Flush mounted.
 - 2. Provide raised covers for boxes to suit the wall or ceiling, construction and finish.
- B. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling in operations.
- C. Remove only knockouts as required and plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.
- D. Outlet boxes in the same wall mounted back-to-back are prohibited. A minimum 24 inch, center-to-center lateral spacing shall be maintained between boxes.
- E. Minimum size of outlet boxes for ground fault interrupter (GFI) receptacles is 4 inches square by 2-1/8 inches deep, with device covers for the wall material and thickness involved.
- F. Clean all debris out of floor boxes.

3.4 IDENTIFICATION

- A. Stencil or install phenolic nameplates on covers of the boxes identified on riser diagrams; for example "SIG-FA JB No. 1"
- B. On all concealed junction box covers, identify the circuits with black marker. For exposed junction boxes use printed labels.

END OF SECTION

SECTION 260548 – VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Refer to section 260510.

1.2 QUALITY ASSURANCE

- A. Submittals must be signed and sealed shop drawings from a professional engineer licensed in the state that the project is located in. Shop drawings to include project specific details, sketches, product data cut sheets.
- B. The contractor shall provide pre-engineered seismic restraint systems to meet total design lateral force requirements for support and restraint of piping, conduit, cable trays and other similar systems and equipment where required by the applicable building code.
- C. System Supports/Restraints Manufacturers shall be firms regularly engaged in the manufacture of products of the types specified in this section, whose products have been in satisfactory use in similar service for not less than 5 years.

PART 2 - PRODUCT

2.1 SEISMIC BRACING

- A. General:
 - 1. Seismic restraint designer shall coordinate all attachments with the structural engineer of record.
 - 2. Design analysis shall include calculated dead loads, static seismic loads, and capacity of materials utilized for the connection of the equipment or system to the structure.
 - 3. Analysis shall detail anchoring methods, bolt diameter, and embedment depth.
 - 4. All seismic restraint devices shall be designed to accept without failure the forces calculated per the details and notes on the construction documents
- B. Friction from gravity loads shall not be considered resistance to seismic forces.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All seismic restraint systems shall be installed in strict accordance with the manufacturer's seismic restraint guidelines manual and all certified submittal data
- B. Installation of seismic restraints shall not cause any change in position of equipment or piping, resulting in stresses or misalignment.
- C. No rigid connections between equipment and the building structure shall be made that degrade the noise and vibration-isolation system specified.

- D. Do not install any equipment, piping, duct, or conduit that makes rigid connections with the building.
- E. Prior to installation, bring to the Contracting Officer's attention any discrepancies between the specifications and the field conditions, or changes required due to specific equipment selection.
- F. Bracing may occur from flanges of structural beams, upper truss cords of bar joists, cast in place inserts, or wedge-type concrete anchors. Consult structural engineer of record.
- G. Overstressing of the building structure shall not occur from overhead support of equipment. Bracing attached to structural members may present additional stresses. The contractor shall submit loads to the structural engineer of record for approval in this event.
- H. Brace support rods when necessary to accept compressive loads. Welding of compressive braces to the vertical support rods is not acceptable.
- I. Provide reinforced clevis bolts where required.
- J. Seismic restraints shall be mechanically attached to the system. Looping restraints around the system is not acceptable.
- K. Do not brace a system to two independent structures such as a ceiling and wall.
- L. Provide appropriately sized openings in walls, floors, and ceilings for anticipated seismic movement.

3.2 FIELD QUALITY CONTROL

- A. Inspect all seismic supports after installation and submit a report from a professional engineer licensed in the state that the project is located in.

END OF SECTION

SECTION 260553 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Refer to section 260510.

PART 2 - PRODUCTS

2.1 NAMEPLATES AND LABELS

- A. Nameplates: Engraved three-layer laminated plastic, black letters on white background unless noted otherwise.
- B. Locations:
 - 1. Each electrical distribution and control equipment enclosure.
- C. Letter Size:
 - 1. Use 1/4 inch (6 mm) letters for identifying grouped equipment and loads.
- D. Labels: Embossed adhesive tape, with 3/16 inch (5 mm) white letters on black background. Use only for identification of individual wall switches, receptacles, and control device stations. Labels shall identify the panel and circuit number (Ex: PANEL: CIRCUIT).
- E. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 7000 psi (48.2 MPa).
 - 3. UL 94 Flame Rating: 94V-0.
 - 4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
 - 5. Color: burgundy.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive nameplates and labels.

3.2 INSTALLATION

- A. Install nameplates and labels parallel to equipment lines.
- B. Secure nameplates to equipment front using corrosion resistant screws.
- C. Secure nameplates to inside surface of door on panelboard that is recessed in finished locations.
- D. Provide name plates on all disconnects, and panelboards.

E. Provide labels on all receptacles, and light switches.

END OF SECTION

SECTION 262726 – WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the requirements for the following:
 - 1. Receptacles.
 - 2. Device plates.
 - 3. Wall switches.

1.2 SUBMITTALS

- A. Refer to section 260510.

1.3 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Products: Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.4 REFERENCE STANDARDS

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; current edition.
- B. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; current edition).
- C. NEMA WD 6 - Wiring Device -- Dimensional Requirements; National Electrical Manufacturers Association; current edition.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Cooper Wiring Devices
 - 2. GE Industrial
 - 3. Leviton Manufacturing, Inc
 - 4. Hubbell, Inc
 - 5. Lutron Electronics Inc
 - 6. Wattstopper Inc
 - 7. Schneider Electric
 - 8. Legrand – Pass & Seymour

- 9. C.W. Cole & Company
- 10. Acuity Brands Lighting, Inc

2.2 RECEPTACLES

- A. Receptacles: Fed spec listed complying with NEMA WD 6 and WD 1.
 - 1. Device Body: color by contracting officer plastic, or Red for emergency power devices.
 - 2. Configuration: NEMA WD 6, type as specified and indicated.
 - 3. Type 5-20.
- B. GFCI Receptacles: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements. Feed through GFCI devices shall not be used. GFCI devices shall contain self-testing feature with power lockout if self-test fails.
- C. Special Purpose Receptacles: Provide heavy-duty type as indicated on the drawings.
- D. Wet Location: A receptacle installed in a wet location shall be GFCI listed weather-resistant type.

2.3 WALL PLATES

- A. Cover Plates: Provide one piece wall plates for wiring devices, with ganging and cutouts as required. Provide blank wall plates for all un-used outlet boxes. Provide with metal screws for securing plates to devices, screw heads colored to match finish of plate. All plates shall be standard size, smooth stainless steel.
- B. Weatherproof Cover Plates: All devices installed outdoors and indoor devices specifically indicated, shall be provided with weatherproof covers. Covers shall be of the type that maintains weatherproof integrity when in-use and not in-use. Covers shall be listed and identified as "extra duty" type.

2.4 WALL SWITCHES

- A. Wall Switches: Heavy Duty, AC only general-use snap switch, complying with NEMA WD 6 and WD 1.
 - 1. Body and Handle: color by contracting officer plastic with toggle handle, or red for emergency power devices.
 - 2. Ratings: Match branch circuit and load characteristics.
 - 3. Switch shall be rated for the horse power of the motor served.
- B. Switch Types: Single pole, double pole, 3-way, and 4-way.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that outlet boxes are installed at proper height.
- B. Verify that wall openings are neatly cut and will be completely covered by wall plates.

- C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

3.3 INSTALLATION

- A. Install securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Install devices plumb and level.
- C. Do NOT utilize back wiring on any wiring device.
- D. Install receptacles with grounding pole on top.
- E. Do not install receptacles within 6" of the edge of sinks.
- F. Connect wiring device ground terminal to outlet box with bonding jumper.
- G. All receptacles installed as listed below shall be GFCI type.
 - 1. Receptacles installed outdoors.
 - 2. Any other receptacles specifically indicated on the drawings.
- H. Connect wiring devices by wrapping conductor around screw terminal.
- I. Provide engraved stainless steel wall.
- J. Install switches with OFF position down.

3.4 FIELD QUALITY CONTROL

- A. Perform all field inspection, testing, and adjusting specified in NETA STD ATS.
- B. Inspect each wiring device for defects.
- C. Verify that each receptacle device is energized.
- D. Test each receptacle device for proper polarity.
- E. Test each GFCI receptacle device for proper operation.
- F. Operate each wall switch with circuit energized and verify proper operation.

3.5 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

- B. It shall be the contractor's responsibility to locate and aim occupancy sensors in the correct location required for complete and proper volumetric coverage within the range of coverage(s) of controlled areas per the manufacturer's recommendations. Rooms shall have ninety (90) to one hundred (100) percent coverage to completely cover the controlled area to accommodate all occupancy habits of single or multiple occupants at any location within the room(s). The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. The contractor shall provide additional sensors if required to properly and completely cover the respective room.
- C. Proper judgment must be exercised in executing the installation so as to ensure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structural components. The contractor shall also provide, at the owner's facility, the training necessary to familiarize the owner's personnel with the operation, use, adjustment, and problem solving diagnosis of the occupancy sensing devices and systems.

3.6 CLEANING

- A. It is anticipated that painting and other finish work may occur after device installation. Device plates shall not be installed until these activities are completed. Protect device and conductors by installing molded plastic cover.
- B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

SECTION 264100 – FACILITY LIGHTNING PROTECTION

PART 1 - GENERAL

1.1 SCOPE OF WORK:

- A. The work required under this section of the specifications consists of the layout and installation of a functional and unobtrusive lightning protection system for the entire facility. Other requirements are shown on the drawings. All materials and devices which are an integral part of the lightning protection system shall be provided under this section of the Specifications.
- B. Definitions: Terms as defined in NFPA 780 shall apply to this section.

1.2 QUALITY ASSURANCE:

- A. The following standards are incorporated into and become a part of this specification by reference.
 - 1. National Electric Code (NFPA 70)
 - a. Lightning Protection Code (NFPA 780)
 - b. IEEE Std 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems
 - 2. Underwriters Laboratories, Inc.
 - a. 96 Lightning Protection Components
 - b. 96A Installation Requirements for Lightning Protection Systems
 - 3. Lightning Protection Institute
 - a. LPI-175 Lightning Protection Installation Standard
 - b. LPI-176 Lightning Protection System Material and Component Standard
 - c. LPI-177 Inspection Guide for LPI Certified Systems
- B. Acceptable manufacturers, contingent upon compliance with the contract documents, are as listed below. Bidders shall carefully review the requirements listed in the technical specifications and only submit products that are equal or better. Equal products by other manufacturers are acceptable providing substitutions are submitted in accordance with requirements listed in the “Instructions to Bidders” (AIA A701) and approved by the A/E. Bidders shall carefully review the front end documents (AIA A701) and submit all information required to allow the A/E the ability to make a fully informed decision.
 - 1. Acceptable Manufacturers: Firms regularly engaged in manufacture of lightning protection system components, of types, sizes, and ratings required.
- C. Installer's Qualifications - Firm with at least five years of successful installation experience with projects utilizing lightning protection system similar to that required for this project.

1.3 SUBMITALS:

- A. Refer to section 260510.

PART 2 - PRODUCTS

2.1 LIGHTNING PROTECTION SYSTEM COMPONENTS

- A. General: Provide lightning protection system material and components, of types, sizes, ratings, for Class 1 service, which comply with manufacturer's standard materials, design, and construction in accordance with published product information, and as required for complete installation. Materials and all components shall comply with NFPA 780.
- B. All materials shall be copper, aluminum, or bronze of the size, weight and construction required to suit this application.
- C. Copper equipment shall not be connected to aluminum surfaces except by means of on LPI approved bi-metal transition fitting. Lead-coated fittings are not acceptable.
- D. Ground rods shall be the type specified in Section 260526 "Grounding and Bonding for Electrical Systems". All rods shall be accessible, and shall be provided with a waterproof tag labelled "LIGHTNING PROTECTION SYSTEM".

PART 3 - EXECUTION

3.1 INSTALLATION OF LIGHTNING PROTECTION SYSTEMS

- A. Install lightning protection systems as indicated, in accordance with equipment manufacturer's written instructions, and in compliance with applicable requirements of NEC, NFPA 780 to ensure that lightning protection systems comply with requirements.
- B. Coordinate with all trades as necessary, to interface installation of lightning protection system with other work.
- C. Install conductors with direct paths from air terminals to ground connections avoiding sharp bends and narrow loops.
- D. All roof conductors shall be concealed. Provide all necessary components for a concealed system installation.
- E. Where the drawings show the new lightning protection system connected to an existing lightning protection system without a UL master label, the new portion of the lightning system still requires inspection and labels as specified above for new work.
- F. Install the vertical conductors within the concealed cavity of exterior walls. Run the conductors to the exterior at elevations below the finished grade and make the ground connections to the earth outside of the building or stack perimeter.
- G. Make connections of dissimilar metal with bimetallic type fittings to prevent electrolytic action.
- H. Use the exothermic welding type connections that form solid metal joints in the main vertical and horizontal conductors, and for connections that are not exposed in the finish work.
- I. Sheath copper conductors, which pass over cast stone, cut stone, architectural concrete and masonry surfaces, with not less than a 2 mm (1/16 inch) thickness of lead to prevent staining of the exterior finish surfaces.

- J. When the structural steel framework or reinforcing steel is used as the main conductor:
1. Weld or bond the non-electrically-continuous sections together and make them electrically continuous.
 2. Verify the electrical continuity by measuring the ground resistances to earth at the ground level, at the top of the building or stack, and at intermediate points with a sensitive ohmmeter. Compare the resistance readings.
 3. Connect the air terminals together with an exterior conductor connected to the structural steel framework at not more than 18000 mm (60 foot) intervals.
 4. Install ground connections to earth at not more than 18000 mm (60 foot) intervals around the perimeter of the building.
 5. Weld or braze bonding plates, not less than 200 mm (eight inches) square, to cleaned sections of the steel and connect the conductors to the plates.
 6. Do not pierce the structural steel in any manner. Connections to the structural steel shall conform to UL Publication No. 96A.

3.2 DOWN CONDUCTORS

- A. Down conductors shall be installed in 1" schedule 40 PVC conduit. All down conductors shall be installed concealed.

3.3 INTERCONNECTION OF METALS

- A. Provide potential equalization and bonding of metal bodies as required by NFPA 780.
- B. Bonding of all metallic objects and systems at roof levels and within the structures shall be complete. Bonds for metal bodies shall consist of, but not be limited to the following: Roof exhaust fans, HVAC units with related piping ductwork, exhaust vents and any other piping systems, antenna mast for TV, radio or microwave, flag poles, roof handrails and/or decorative screens, roof ladders, skylights, metal plumbing stacks, etc. Exterior architectural metal fascia and/or curtain walls or mullions, which extend the full height of the structure shall also be bonded, if not inherently bonded thru the building frame.
- C. Other metal bodies shall be bonded as required by NFPA 780. Typical of these are: roof flashings, parapet coping caps, gravel guards, isolated metal building panels or siding, roof drains, down spouts, roof insulation vents and any other sizable miscellaneous metals, etc.

3.4 GROUNDING

- A. Grounding terminals (rods) shall be provided for each down conductor.

3.5 BONDING

- A. Where conductors are installed in metallic raceways, bond conductor to raceway at both ends.

3.6 TESTING

- A. Upon completion of installation of lightning protection system, test resistance-to-ground as specified in Section 260526 "Grounding and Bonding for Electrical Systems"..
- B. Update shop drawings to reflect all field changes.

- C. Test and certify the system per UL, and NFPA. Provide UL Master Label certification. Permanently affix label in a location approved by the Contracting Officer.

END OF SECTION

SECTION 265100 – LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the requirements for the following:
 - 1. Interior luminaires and accessories.
 - 2. Emergency lighting units.
 - 3. Luminaire accessories.

1.2 SUBMITTALS

- A. Refer to section 260510.

1.3 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70 and NFPA 101.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.4 REFERENCE STANDARDS

- A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; current edition.
- B. ANSI C78.377 – American National Standard for Electric Lamps – Specifications for the Chromaticity of Solid State Lighting Products.
- C. IESNA LM-63 - ANSI Approved Standard File Format for Electronic Transfer of Photometric Data and Related Information; current edition.
- D. IESNA LM-79-08 – Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products.
- E. IESNA LM-80-08 – Approved Method: Measuring Lumen Maintenance of LED Light Sources.
- F. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; National Electrical Contractors Association; current edition.
- G. NEMA WD 6 - Wiring Devices - Dimensional Requirements; National Electrical Manufacturers Association; current edition.
- H. NFPA 70 - National Electrical Code; National Fire Protection Association, current edition.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of design is as scheduled on drawings. Acceptable manufacturers, contingent upon compliance with the contract documents, are as follows: Oracle, Elite, Lithonia, Williams, and Columbia, or approved equal. Equal products by other manufacturers are acceptable providing substitutions are submitted in accordance with requirements listed elsewhere in the Bid Documents and approved by the Contracting Officer.
- B. Basis of Design products and their requirements are listed in lighting fixture schedule on drawings.
- C. LM-79 reports must be submitted with all proposed LED substitutions from Basis of Design, regardless of whether manufacturer is listed as an approved equal.

2.2 LUMINAIRES

- A. Furnish products as indicated in Schedule on plans. Approved equals shall meet requirements in this specification and Division 1 and requirements listed in the Lighting Fixture Schedule and notes on Drawing E2.

2.3 EMERGENCY LED DRIVERS

- A. Regardless of catalogue number shown in fixture schedule, all fixtures indicated to be emergency type shall be provided with emergency type driver battery packs conforming to the following:
 - 1. Fixture Using Integral Emergency Driver/Battery Pack: Provide emergency driver installed within the fixture. The charging light and test switch shall be accessible/visible from below. Driver/Battery must be capable of operating fixture at 75% of fixture lumens for a minimum of 90 minutes. Drivers/batteries shall have full 5-year warranty.
 - 2. Fixture Using Remote Emergency Driver/Battery Pack: Provide Iota or Bodine emergency driver/battery pack installed remotely above accessible ceiling. Driver/Battery must be capable of operating fixture at 75% of fixture lumens for a minimum of 90 minutes. Drivers/batteries shall have full 5-year warranty.
- B. Integral emergency drivers/batteries shall be factory installed whenever possible.
- C. Drivers/batteries installed in fixtures located outdoors or unheated spaces shall be suitable for the ambient temperatures encountered or remotely located in a nearby accessible space.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install fixtures securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting).
- B. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.

- C. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- D. Install wall mounted luminaires, and emergency lighting units as indicated on Drawings.
- E. Install accessories furnished with each luminaire.
- F. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- G. Bond products and metal accessories to branch circuit equipment grounding conductor.
- H. Install specified lamps in each emergency lighting unit, and luminaire.

3.2 FIELD QUALITY CONTROL

- A. Perform field inspection in accordance with Section 01 40 00.
- B. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.3 ADJUSTING

- A. Aim and adjust luminaires as indicated.

3.4 CLEANING

- A. Clean electrical parts to remove conductive and deleterious materials.
- B. Remove dirt and debris from enclosures.
- C. Clean photometric control surfaces as recommended by manufacturer.
- D. Clean finishes and touch up damage.

3.5 CLOSEOUT ACTIVITIES

- A. Demonstrate luminaire operation for minimum of two hours.

3.6 PROTECTION

- A. Replace/Repair luminaires that have failed at Substantial Completion.

END OF SECTION

APPENDIX

HAZARDOUS BUILDING MATERIALS ASSESSMENT REPORT



**Hazardous Building Materials Assessment Report
Cape Lookout Lighthouse
Cape Lookout National Seashore
Harkers Island, North Carolina
S&ME Project No. 22130469**

PREPARED FOR:

**Liollio Architecture
147 Wappoo Creek Drive, Suite 400
Charleston, SC 29412**

PREPARED BY:

**S&ME, Inc.
620 Wando Park Boulevard
Mt Pleasant, SC 29464**

November 10, 2022



November 10, 2022

Liollio Architecture
147 Wappoo Creek Drive, Suite 400
Charleston, South Carolina 29412

Attention: Mr. Rick Bousquet, AIA, LEED AP, Principal
rick@liollio.com

Reference: **Hazardous Building Materials Assessment Report**
Cape Lookout Lighthouse
Harkers Island, North Carolina
S&ME Project Number 22130469

Dear Mr. Bousquet:

S&ME, Inc. (S&ME) is pleased to provide the enclosed report detailing the hazardous building materials assessment of referenced structure. The purpose of the assessment was to identify, to the extent feasible, asbestos-containing materials, lead-based paint, mercury and polychlorinated biphenyl sources prior to planned renovation activities. Our services were performed in general accordance with S&ME Proposal No. 22130469R dated August 29, 2022 and the Subconsultant Agreement between S&ME and Liollio Architecture. The following report includes the project background, sampling and analysis procedures, findings and results, and conclusions and recommendations.

This report is provided for the sole use of Liollio Architecture. Use of this report by any other parties will be at such party's sole risk and S&ME, Inc. disclaims liability for any such use or reliance by third parties. The results presented in this report are indicative of conditions only during the time of the assessment and of the specific area referenced. The information provided in this assessment report should not be used as a bidding document, and field conditions should be verified.

We appreciate the opportunity to provide you with our industrial hygiene services. If you have any questions concerning this report, please call us at (843) 884-0005.

Sincerely,

S&ME, Inc.

A handwritten signature in black ink, appearing to read 'Travis Knight'.

Travis Knight, CSP, CHMM, CIEC
Senior Industrial Hygienist

A handwritten signature in blue ink, appearing to read 'Terry W. Richburg'.

Terry W. Richburg
Environmental Group Leader

Attachments



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Appendices

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Executive Summary

A hazardous building materials assessment was conducted October 27 and 28, 2022 at the Cape Lookout Lighthouse located at Cape Lookout National Seashore in Harkers Island, North Carolina. The purpose of the assessment was to identify the presence of asbestos containing materials (ACMs), lead-based paint, and polychlorinated biphenyl (PCB) and mercury sources associated with the referenced structure prior to planned renovation activities. The assessment also complies with federal, state, and local asbestos requirements regarding identification of ACMs that may be disturbed due to renovation or demolition.

The Cape Lookout Lighthouse was reportedly constructed in 1859. The lighthouse is primarily constructed of brick and structural steel, with metal interior stairs. We understand that the lighthouse has been closed to the public since 2021 due to structural concerns.

Asbestos Assessment

The suspect ACMs sampled and analyzed as part of this assessment included several styles of caulk, block filler, window glazing, and mortar.

No asbestos was detected in the representative materials sampled and analyzed as part of this assessment. However, the exterior window glazing associated with the observation windows on the ninth landing level was inaccessible and is therefore assumed to contain asbestos.

Table E-1 ACM Summary

Material	HA	Material Location	Asbestos Type	Percent	Condition	Potential for Disturbance	¹ Approx. Quantity
² Window Glazing	WG1	Exterior of observation windows on 9 th landing (at light level)	Assumed	Assumed	G, NF	PD	600 LF

¹The quantities are estimated and should be field verified for bidding purposes.

²The observation deck on the 9th landing level was inaccessible and structurally unsound, therefore no bulk samples were collected and analyzed

Abbreviations:

HA = homogeneous area

SF = square feet

LF = linear feet

G = good D = damaged

NF = non-friable

F = friable

LPD = low potential for disturbance

PD = potential for disturbance

PSD = potential for sig. disturbance

The identified exterior window glazing located on the ninth landing level was inaccessible, therefore assumed to be an ACM, and is classified as a Category I non-friable ACM, in good condition, with a potential for disturbance depending on renovation activities. No asbestos was detected in the bulk samples collected and analyzed.

S&ME recommends bulk sampling and analysis of the identified assumed ACM when the material can be safely sampled by a North Carolina Health Hazards Control Unit (NC-HHCU) accredited asbestos inspector or the



assumed ACM must be properly removed and disposed by a NC-HHCU accredited asbestos abatement contractor, prior to any destructive activities. The owner or operator must provide the NC-HHCU with written notification of planned abatement activities at least 10 weekdays days prior to the commencement of asbestos abatement or demolition activities.

If suspect ACMs are discovered during the renovation activities that are not addressed in this report or prior assessment reports, bulk samples must be collected by a NC-HHCU licensed asbestos inspector and analyzed for asbestos content, prior to disturbance or disposal of the suspect materials. This report should also be provided to the contractor(s) to assist with compliance of applicable State and Federal regulations.

Lead-Based Paint Assessment

The lead-based paint assessment included testing representative interior and exterior painted components throughout the structure for lead content. Of the representative painted components tested, the following components exhibited lead concentrations meeting the EPA lead level of 0.5 percent by weight by laboratory analysis.

- ◆ Center stairway supports/conduit (black on green, white, red, and yellow paint on metal) – deteriorated condition
- ◆ Structural steel and ceiling (green paint on metal) first landing level - non-deteriorated condition.
- ◆ Structural steel and components ninth landing level (white paint on metal) – non-deteriorated condition.
- ◆ Interior stairs and handrails (black on white and red paint on metal) – deteriorated condition.

Low levels of lead were also detected in other paints tested, which may be applicable to the standards of the OSHA 29 CFR 1926.62 (Lead in Construction) dependent upon the tasks impacting those surfaces.

Lead-based paint and lead containing products, as defined by North Carolina and the EPA, require proper handling and disposal. The identified components coated with lead-based paint may be subject to complete component removal, have the surfaces stabilized and prepared to the extent suitable for new coatings/finishes, or those lead-based paint coatings may be subject to complete removal by means of a specifically manufactured and marketed product suitable for the chemical removal of lead-based paint. North Carolina solid waste disposal regulations do not stipulate disposal requirements for components coated with lead-containing paint or lead-based paint, meaning the construction debris can be disposed in a construction and demolition landfill. If the paint is removed from the substrate/component, samples must be collected and tested using the Toxic Characteristic Leaching Procedure (TCLP) to determine the proper landfill required for the waste stream.

Mercury Screening

Representative fluorescent lamps and bulbs were visually screened for mercury. Based on the observations at the time of the assessment, the following suspected mercury containing items were identified:

- ◆ Compact fluorescent lamps (CFLs) – 6 each
- ◆ Fluorescent light tube (4") – 1 each



- ◆ Light bulbs – 2 each

No other suspect mercury-containing equipment was observed in the building.

The referenced items inherently contain low levels of mercury and must be recycled or properly disposed as mercury sources. Mercury is designated as a Universal Waste by the EPA under 40 CFR 273, the Resource Conservation and Recovery Act (RCRA). If the planned activities require disposal of the referenced items, we recommend recycling at a Universal Waste Destination Facility.

Polychlorinated biphenyls (PCBs)

S&ME conducted a screening for suspect PCB containing materials and sampling of bulk materials which were safely accessed, were analyzed by EPA Method SW 8082/608. No materials sampled exhibited a PCB content meeting the EPA's PCB bulk product limit of 50 parts per million (ppm).

Accessible light ballasts in representative light fixtures throughout the structure were visually screened for PCB labeling. PCBs were banned in the United States in 1976. From 1978 to July 1, 1998, the EPA required manufacturers of fluorescent light ballasts to label the ballasts with the statement "No PCBs." Since this is no longer a requirement of manufacturers, any ballasts known to be installed after 1998 with no identifiable PCB labeling are not considered to contain PCBs.

Two ballasts without PCB labeling were observed on the first landing level (storage area), therefore the ballasts are presumed to contain PCBs. One small electronic ballast, which indicated it does not contain PCBs, associated with the small approximately 4-inch fluorescent tube, was observed. No other light ballasts were observed during the assessment. Sampling and testing of suspect PCB-containing light ballasts was not performed as part of this screening.

PCB containing ballasts are required by the EPA to be disposed in accordance with 40 CFR 761, subpart D of the Toxic Substance Control Act (TSCA). We recommend recycling, high temperature incineration, or disposal of any suspect PCB-containing equipment in a hazardous waste landfill.

This summary is for convenience of the reader and should not be completely relied upon without reviewing the full contents of this report, including appended materials.



1.0 Background

S&ME, Inc. (S&ME) was contracted by Liollio Architecture to perform a hazardous building materials assessment of the Cape Lookout Lighthouse located at the Cape Lookout National Seashore in Harkers Island, North Carolina. The assessment was subsequently performed October 27 and 28, 2022.

The work performed as a part of this report consisted of an asbestos and lead-based paint assessment, bulk sampling of suspect polychlorinated biphenyl (PCB) materials and visual screening of potential sources, and a visual screening for mercury. The purpose of the assessment was to identify the presence of asbestos containing materials (ACMs), lead-based paint, and mercury and PCB containing products associated with the interior and exterior of the subject structure to support planned renovations. The assessment also complies with federal, state, and local asbestos requirements regarding identification of ACMs that may be disturbed due to renovation or demolition.

2.0 Site and Project Description

2.1 Purpose

The purpose of the assessment was to identify the presence of ACMs and lead-based paint, PCB materials and sources, and mercury sources. The assessment included the interior and exterior of the Cape Lookout Lighthouse located at the Cape Lookout National Seashore in Harkers Island, North Carolina. An assessment strategy appropriate for this purpose was presented in our proposal and is described in this report. The report should be interpreted only with regard to the specific location and materials referenced.

2.2 Site Description

The Cape Lookout Lighthouse was reportedly constructed in 1859. The lighthouse is primarily constructed of brick and structural steel, with metal interior stairs. We understand that the lighthouse has been closed to the public since 2021 due to structural concerns.

3.0 Asbestos Assessment

The asbestos assessment was conducted by visually and physically assessing suspect ACM, and sampling in accordance with regulatory requirements. The identification of ACMs will aid in the prevention of occupational exposures and/or environmental releases of airborne asbestos. Identification of ACMs also complies with Title 40 Code of the Federal Regulations, part 61, and North Carolina Health Hazard Control Unit (HHCU) regulations, along with Title 29 Code of Federal Regulations, part 1926 enforced by the Occupational Safety and Health Administration (OSHA). The following sections describe the assessment procedures used, results of the suspect ACMs sampled and analyzed, and conclusions and recommendations related to ACMs.



3.1 Procedures

The assessment was performed by observing and sampling suspect ACMs associated with the interior and exterior of the referenced structure. The possibility exists that suspect materials were undetected in inaccessible areas such as wall voids, pipe chases, flooring overlays, and inaccessible observation decks. If additional suspect ACMs not identified in this report are discovered during destructive activities, bulk samples must be collected by an accredited inspector and analyzed for asbestos content prior to disturbance or disposal of the suspect materials.

A sampling strategy was developed to provide representative samples in accordance with the NC-HCCU and Environmental Protection Agency (EPA). Bulk samples of suspect ACMs were collected by an accredited inspector. The bulk samples were then extracted from suspect ACMs and recorded on a chain of custody record and submitted to *EMSL Analytical* for analysis via Polarized Light Microscopy (PLM) laboratory. The laboratory is located in Pineville, North Carolina and is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP), which is administered by the National Institute of Standards and Technology.

Polarized Light Microscopy (PLM)

The suspect materials were analyzed by trained microscopists using PLM techniques coupled with dispersion staining in accordance with EPA Test Method Title 40 Code of Federal Regulations, Chapter I (1-1-87 edition), Part 763, Subpart F-APPENDIX A. This method identifies asbestos mineral fibers based on six optical characteristics: morphology, birefringence, refractive index, extinction angle, sign of elongation and dispersion staining colors. The laboratory analysis reports the specific type of asbestos identified (there are six asbestos minerals) and the percentage of asbestos present.

3.2 Findings and Results

The suspect ACMs sampled on October 27 and 28 2022 consisted of several caulks, window glazing, and block filler coating. No asbestos was detected in the representative materials sampled and analyzed as part of this assessment, however the exterior window glazing associated with the observation windows on the ninth landing level was inaccessible and is therefore assumed to contain asbestos.

Table 3-2 ACM Summary

Material	HA	Material Location	Asbestos Type	Percent	Condition	Potential for Disturbance	¹ Approx. Quantity
² Window Glazing	WG1	Exterior of observation windows on 9 th landing (at light level)	Assumed	Assumed	G, NF	PD	600 LF

¹The quantities are estimated and should be field verified for bidding purposes.

²The observation deck on the 9th landing level was inaccessible and structurally unsound, therefore no bulk samples were collected and analyzed

Abbreviations:

HA = homogeneous area

SF = square feet

LF = linear feet

G = good D = damaged

NF = non-friable

F = friable

LPD = low potential for disturbance

PD = potential for disturbance

PSD = potential for sig. disturbance



A summary of asbestos results is provided in Appendix I, and exhibits the sample number, location, type of material tested, approximate quantity of the material sampled, condition of the material, and corresponding result for each sample. Diagrams exhibiting the locations of identified hazardous materials are provided in Appendix II. Copies of the inspectors' accreditations are provided in Attachment IV and the laboratory analyses and chain-of-custody records are provided in Attachment V.

4.0 Lead-Based Paint Assessment

The purpose of the lead-based paint assessment was to identify lead-based paint coatings and lead-containing products associated with the subject structure. The identification of these materials will aid in the compliance of occupational exposure and/or environmental releases of airborne lead dust in accordance with the OSHA regulations found in 29 CFR 1926.62 (Lead in Construction) and provide information to determine proper disposal of lead-based paint coated components and debris in accordance with EPA.

The OSHA does not recognize a threshold level of lead for definition purposes, only the airborne concentration of lead a worker is exposed. The current OSHA regulations recognize an airborne action level of 30 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) during an eight-hour day and a permissible exposure limit of 50 $\mu\text{g}/\text{m}^3$.

4.1 Procedure

A visual assessment of the structure was performed to identify combinations of paint suspected of containing lead, based on paint color, building component, and substrate. The EPA defines LBP as paint having a lead content greater than or equal to 0.5 percent by weight (% by weight) via laboratory analysis. Paint containing detectable lead levels but less than 0.5 % by weight using laboratory analysis is considered lead containing and regulated by the OSHA.

Paint chip samples were collected from representative interior and exterior painted components associated with the referenced structure by physically removing a small portion (approximately two square inches) from the substrate using a cutting or coring tool. Each paint chip sample was placed into a sealed and labeled container, and sample locations and descriptions were recorded. The paint chip samples were submitted to EMSL Analytical, Inc., which is a National Lead Laboratory Accreditation Program accredited laboratory, for analysis.

4.2 Findings and Results

Of the representative painted surfaces tested, the following components exhibited lead concentrations meeting the EPA limit of 0.5% by weight.

- ◆ Center stairway supports/conduit (black on green, white, red, and yellow paint on metal) – deteriorated condition
- ◆ Structural steel and ceiling (green paint on metal) first landing level - non-deteriorated condition.
- ◆ Structural steel and components ninth landing level (white paint on metal) – non-deteriorated condition.
- ◆ Interior stairs and handrails (black on white and red paint on metal) – deteriorated condition.



Additionally, detectable levels of lead, which are applicable to OSHA Regulation 29 CFR 1926.62 (Lead in Construction) were identified in various painted components associated with the structure. A summary of the paint chip sampling is provided in Appendix I and should be reviewed in full.

5.0 Mercury

The mercury screening was conducted by visually inspecting thermostats and fluorescent lamps and bulbs associated with the referenced structure. Mercury is designated as a Universal Waste by the EPA under 40 CFR 273, the Resource Conservation and Recovery Act (RCRA) and requires proper handling and disposal of mercury containing items. The identification of these materials will aid in the prevention of occupational exposures and/or environmental releases of mercury and provide information to facilitate proper disposal of mercury containing items in accordance with EPA Universal Waste requirements.

5.1 Procedure

The mercury screening was conducted to identify liquid mercury or mercury vapor containing sources associated with the structure. The mercury screening was performed by visually assessing mercury vapor lamps and liquid mercury bulb thermostats. Sampling and testing of mercury sources was not performed as part of this screening.

5.2 Findings

Based on the observations at the time of the assessment, the following suspected mercury containing items were identified:

- ◆ Compact fluorescent lamps (CFLs) – 6 each
- ◆ Fluorescent light tube (4") – 1 each
- ◆ Light bulbs – 2 each

The small four-inch fluorescent light tube, compact fluorescent light bulbs, and suspected mercury vapor bulbs in the building inherently contain low levels of mercury and must be recycled or properly disposed as mercury sources. No other suspect mercury-containing equipment was observed in the building.

The locations of the identified mercury-containing lamps/bulbs are on the diagrams provided in Appendix II.

6.0 Polychlorinated Biphenyls

(PCBs were banned in the United States in 1976. From 1978 to July 1, 1998, the EPA required manufacturers of fluorescent light ballasts to label the ballasts that do not contain PCBs with the statement "No PCBs." Since this is no longer a requirement of manufacturers, any ballasts known to be installed after 1998 with no identifiable PCB labeling are not considered to contain PCBs. PCBs are regulated under the Toxic Substance Control Act (TSCA).



6.1 Procedure

S&ME conducted a visual screening for suspect PCB sources and bulk sampling of suspect PCB containing materials. The bulk samples were analyzed for PCBs via EPA Method SW 8082/608. Only those bulk materials that could be safely accessed were sampled and analyzed for PCBs.

The PCB screening was performed by opening representative light fixtures of various styles throughout the structure and observing the ballast(s) for "No PCBs" labeling. Suspect PCB containing materials sampled included caulking, paints, and block filler coating.

6.2 Findings

Of the suspect PCB containing materials sampled, none contained PCB levels meeting the EPA's PCB bulk product limit of 50 parts per million.

As part of the visual screening, two light ballasts associated with uninstalled mercury vapor bulbs located in the first landing level (storage area) was observed. The two light ballasts observed did not have any identifiable PCB labeling thus they are considered to contain PCBs. One small ballast was observed with an approximately four-inch fluorescent bulb on the first landing level. The ballast had a label indicating that it was an electronic ballast, therefore it is considered to be non-PCB containing.

7.0 Conclusions and Recommendations

The hazardous materials assessment performed October 27 and 28, 2022 of the Cape Lookout Lighthouse located at Cape Lookout National Seashore in Harkers Island, North Carolina, identified the presence of an assumed Category I non-friable ACM, lead-based paint, and mercury and PCB containing sources.

This report should be provided to the contractor(s) to assist with compliance with applicable State and Federal regulations. This report should not be used as a bidding document or as a project design or specification for the abatement of hazardous materials.

7.1 Asbestos

Due to the planned renovation activities, which will disturb the identified assumed ACM, we recommend bulk sampling, by a NC-HHCU accredited asbestos inspector, of the identified assumed ACM if/when the material can be safely sampled and analyzed for asbestos content or the assumed ACM must be properly removed and disposed by a NC-HHCU licensed asbestos abatement contractor, prior to any destructive activities. The owner or operator must provide the NC-HHCU with written notification of planned abatement activities at least 10 weekdays prior to the commencement of asbestos abatement or demolition activities. If additional suspect ACMs not included in this report are discovered and will be disturbed by renovation/demolition activities, bulk samples must be collected by an accredited asbestos inspector and analyzed for asbestos content, prior to disturbance of the suspect material(s).



Asbestos removal requires written notification to NC-HHCU, specific removal procedures, proper transportation, and disposal per state and federal regulations. The identification and proper removal of ACM prior to demolition or renovation will aid in the prevention of occupational exposures and/or environmental releases of airborne asbestos. If ACMs are managed in place, OSHA requirements apply to employees that may contact or disturb ACMs, including maintenance and custodial workers.

In accordance with NC Department of Health and Human Service (DHHS) regulations (10 NCAC 0600) removal of greater than or equal to 3,000 square feet or 1,500 linear feet of friable ACM from a public area or adjacent to a public area requires that the abatement be designed by a North Carolina accredited asbestos designer and that air monitoring be conducted by an accredited asbestos air monitor in accordance with a plan developed by a North Carolina accredited Supervising Air Monitor.

7.2 Lead-Based Paint & Lead-Containing Materials

LBP was identified in areas that will be impacted by the renovation. If these materials are not removed as whole components and scheduled to be disturbed, the OSHA Lead in Construction regulation requires specific work practice procedures to minimize potential worker exposures.

Demolition activities (e.g., component removal, demolition, sanding, grinding, burning, paint preparation, paint disturbance) involving LBP and lead containing paint are subject to the OSHA Construction Industry Standard for Lead (Title 29 of the Federal Code of Regulations, Part 1926.62). Compliance with the OSHA regulations may require worker training, medical evaluations, personnel protective equipment, exposure assessment, air monitoring, hygiene facilities and practices, and health and safety plans. The quantities reported by laboratory analysis may be useful in determining the relative risk associated with various demolition tasks. For example, disturbances to paints with low lead levels may be less likely to result in airborne lead exposures in excess of the OSHA Action Level.

The OSHA Lead in Construction Standard stipulates a maximum worker exposure limit, referred to as the Permissible Exposure Limit (PEL), of 50 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) over an eight-hour time weighted average (TWA). The standard requires monitoring the lead level in the worker's blood (workers blood lead level) when exposed to airborne lead at or above the Action Level of 30 $\mu\text{g}/\text{m}^3$ over an eight-hour TWA. OSHA requires the employer to make an initial determination of whether an employee's exposure to lead exceeds the Action Level over an eight-hour TWA. Monitoring at the breathing zone of the employee is required unless the employer has objective data demonstrating the employees will not be exposed to lead meeting the Action Level.

North Carolina solid waste disposal regulations do not stipulate disposal requirements for components coated with lead-containing paint or LBP, meaning the construction debris can be discarded in a construction and demolition landfill. If the paint is removed from the substrate/component, a representative sample of the paint accumulations must be analyzed using the Toxicity Characteristic Leaching Procedure (TCLP) to determine the proper landfill for disposal.



7.3 Mercury

Mercury is designated as a Universal Waste by the EPA under 40 CFR 273, of the RCRA. If future activities require disposal of the fluorescent light tubes and compact fluorescent light bulbs, we recommend recycling at a Universal Waste Destination Facility.

7.4 Polychlorinated Biphenyls

PCB containing ballasts must be disposed in accordance with 40 CFR 761, subpart D of the TSCA, as required by the EPA. We recommend recycling, high temperature incineration, or disposal of the suspect PCB-containing ballasts in a hazardous waste landfill, unless specific items are tested and determined to be non-PCB containing. Light ballasts encountered that do not exhibit "No PCBs" labeling and were installed prior to July 1, 1998, must be recycled, incinerated or disposed at an appropriately licensed facility.

8.0 Assumptions and Limitations

This report is provided for the sole use of Liollo Architecture. Use of this report by any other parties will be at such party's sole risk, and S&ME disclaims liability for any such use or reliance by third parties. The results presented in this report are indicative of conditions only during the time of the sampling period and of the specific areas referenced. Under no circumstances is this report to be used as a bidding document, or as a project design or specification for the abatement of hazardous materials.

S&ME performed the services in accordance with generally accepted practices of reputable environmental consultants undertaking similar studies at the same time and in the same geographical area. S&ME has endeavored to meet this standard of care. No other warranty, expressed or implied, is intended or made with respect to this report or S&ME's services. Users of this report should consider the scope and limitations related to these services when developing opinions as to risks associated with the site.

The findings of this hazardous building materials assessment were based largely on visual observations within the amount of time available. The findings do not warrant that all hazardous building materials have been identified; hazardous building materials could be present in areas not readily-accessible to observation. In addition, the actual locations and quantities of materials determined to contain asbestos may vary from those herein. Apparent homogeneous sampling areas may vary in actual asbestos content due to previous renovations, maintenance or related operations. The possibility exists that suspect asbestos containing materials, lead-based paint or bulk PCB containing materials were undetected in inaccessible or concealed areas such as inside pipe chases or wall voids.

Appendices

Appendix I – Summary of Asbestos, Lead-based Paint, and PCB Results



Table I: Summary of Asbestos Results

HA	Material Description	Material Location	² Approx. Quantity	Cat. (F/I/II)	Type	Condition/ Potential for Disturbance	Sample Number	Sample Location	¹ Type and Percent Asbestos
WG1	Window glazing (white)	Ninth landing - Exterior metal windows (inaccessible and landing structurally unsound)	600 LF	NF Cat I	Misc	G, PD	NA	9th Landing - Exterior windows	Presumed
WG2	Window Glazing (white)	Exterior wooden windows	300 LF	NF Cat II	Misc	N/A	WG-1	2nd window level	ND
							WG-2	6th landing	ND
							WG-3	5th landing	ND
BF	Block Filler Coating	Exterior brick walls and various interior walls	8,000 SF	F	Misc	N/A	BF-1	Exterior west wall	ND
							BF-2	Exterior east wall	ND
							BF-3	8th landing small area	ND
							BF-4	Interior at entry	ND
							BF-5	Interior at entry	ND
							BF-6	Exterior south side	ND
							BF-7	Exterior west side	ND
C1	Caulk (gray)	Exterior storage room door	25 LF	NF Cat II	Misc	N/A	C-1	Exterior storage room door	ND
							C-2	Exterior storage room door	ND
							C-3	Exterior storage room door	ND
C2	Caulk (white/clear)	Exterior main door	25 LF	NF Cat II	Misc	N/A	C-4	Exterior main door	ND
							C-5	Exterior main door	ND
							C-6	Exterior main door	ND
M1	Mortar 1	Between bricks	5,000 SF	F	Misc	N/A	M-1	Storage room	ND
							M-2	8th Landing	ND
							M-3	6th landing	ND



Table I: Summary of Asbestos Results

HA	Material Description	Material Location	² Approx. Quantity	Cat. (F/I/II)	Type	Condition/ Potential for Disturbance	Sample Number	Sample Location	¹ Type and Percent Asbestos
C3	Caulk (white)	8th landing between structural steel and brick	20 SF	NF Cat II	Misc	N/A	C-7	8th Landing	ND
							C-8	8th Landing	ND
							C-9	8th Landing	ND
M2	Mortar 2	Around metal frame door at 8th landing	15 LF	F	Misc	N/A	M-4	8th landing door	ND
							M-5	8th landing door	ND
							M-6	8th landing door	ND
C4	Caulk (white)	Interior windows	200 LF	NF Cat II	Misc	N/A	C-11	6th landing window	ND
							C-12	5th landing window	ND
							C-13	2nd window level	ND
³ QC1	Quality Control Sample (white caulk)	Quality Control Sample	NA	NA	NA	NA	QC-C-9	8th landing between steel & brick	ND
³ QC2	Quality Control Sample (mortar)	Quality Control Sample	NA	NA	NA	NA	QC-M-4	8th landing door	ND

LF = linear feet

F= friable

NF = non-friable

Cat I = Category I

Cat II = Category II

Sur = Surfacing

TSI = Thermal System Insulation

G = good EA = each

D = damaged

SD = significantly damaged

Misc = Miscellaneous

PD = potential for disturbance

PSD = potential for significant disturbance

ND = No Asbestos Detected

NA = Not Applicable

¹EPA, NC-HHCU and OSHA defines a material asbestos containing if an asbestos content greater than one percent (>1%) is detected in a representative sample

²Quantities are estimated, and should not be used for bidding purposes, as field conditions should be verified

³Quality control sample as requested by client in scope of services.



Summary of Lead Paint Chip Results

Sample No.	Sample Location	Component	Color	Substrate	Result (% wt)
Pb-01	Exterior	Wall	Black	Brick	0.049%
Pb-02	Exterior	Wall	White	Brick	0.029%
Pb-03	1st Landing Level	Stair center support	Black	Metal	1.2%
Pb-04	1st Landing Level	I-Beam	Green	Metal	10.0%
Pb-05	9th Landing Level	Structural steel	White	Metal	8.0%
Pb-06	8th Landing Level	Stairs	Gray	Metal	0.081%
Pb-07	8th Landing Level	Cabinet	White	Wood	0.120%
Pb-08	7th Landing Level	Ceiling	Black	Metal	0.40%
Pb-09	6th Landing Level	Handrail	Black	Metal	0.91%
Pb-10	5th Landing Level	Stairs	Yellow	Metal	0.083%
Pb-11	5th Landing Level	Window	White	Wood	0.026%
Pb-12	Entry	Door	Black	Metal	<0.0092%
Pb-13	Observation deck	Handrail	Black	Metal	<0.0089%

Bold = Greater than EPA Lead level of 0.5 percent by weight

% wt = percent lead by weight



Summary of PCB Results				
Sample No.	Material Type	Material Location	Method / Parameter	Result (ppm)
P-1	Caulk	First landing level door	3540C/8082A / Arcolor 1016	BRL
			3540C/8082A / Arcolor 1221	BRL
			3540C/8082A / Arcolor 1232	BRL
			3540C/8082A / Arcolor 1242	BRL
			3540C/8082A / Arcolor 1248	BRL
			3540C/8082A / Arcolor 1254	BRL
			3540C/8082A / Arcolor 1260	BRL
P-2	Caulk	Second landing level entry door	3540C/8082A / Arcolor 1016	BRL
			3540C/8082A / Arcolor 1221	BRL
			3540C/8082A / Arcolor 1232	BRL
			3540C/8082A / Arcolor 1242	BRL
			3540C/8082A / Arcolor 1248	BRL
			3540C/8082A / Arcolor 1254	BRL
			3540C/8082A / Arcolor 1260	BRL
			3540C/8082A / Arcolor 1262	BRL
P-3	Caulk	8th landing level between structural steel and brick	3540C/8082A / Arcolor 1016	BRL
			3540C/8082A / Arcolor 1221	BRL
			3540C/8082A / Arcolor 1232	BRL
			3540C/8082A / Arcolor 1242	BRL
			3540C/8082A / Arcolor 1248	BRL
			3540C/8082A / Arcolor 1254	BRL
			3540C/8082A / Arcolor 1260	BRL
P-4	White Paint	Steel, windows and ceilings on 9th landing level	3540C/8082A / Arcolor 1016	BRL
			3540C/8082A / Arcolor 1221	BRL
			3540C/8082A / Arcolor 1232	BRL
			3540C/8082A / Arcolor 1242	BRL
			3540C/8082A / Arcolor 1248	0.037
			3540C/8082A / Arcolor 1254	BRL
			3540C/8082A / Arcolor 1260	BRL
P-5	White block filler	Interior and exterior brick	3540C/8082A / Arcolor 1016	BRL
			3540C/8082A / Arcolor 1221	BRL
			3540C/8082A / Arcolor 1232	BRL
			3540C/8082A / Arcolor 1242	BRL
			3540C/8082A / Arcolor 1248	BRL
			3540C/8082A / Arcolor 1254	BRL
			3540C/8082A / Arcolor 1260	BRL



Summary of PCB Results				
Sample No.	Material Type	Material Location	Method / Parameter	Result (ppm)
P-6	Gray paint	Interior structural steel, stairs, and door	3540C/8082A / Arcolor 1016	BRL
			3540C/8082A / Arcolor 1221	BRL
			3540C/8082A / Arcolor 1232	BRL
			3540C/8082A / Arcolor 1242	BRL
			3540C/8082A / Arcolor 1248	BRL
			3540C/8082A / Arcolor 1254	BRL
			3540C/8082A / Arcolor 1260	BRL
P-7	White paint	Cabinet on 8th landing level	3540C/8082A / Arcolor 1016	BRL
			3540C/8082A / Arcolor 1221	BRL
			3540C/8082A / Arcolor 1232	BRL
			3540C/8082A / Arcolor 1242	BRL
			3540C/8082A / Arcolor 1248	BRL
			3540C/8082A / Arcolor 1254	BRL
			3540C/8082A / Arcolor 1260	BRL
P-8	Paint (black, gray, red, and green)	Metal floor	3540C/8082A / Arcolor 1016	BRL
			3540C/8082A / Arcolor 1221	BRL
			3540C/8082A / Arcolor 1232	BRL
			3540C/8082A / Arcolor 1242	BRL
			3540C/8082A / Arcolor 1248	BRL
			3540C/8082A / Arcolor 1254	BRL
			3540C/8082A / Arcolor 1260	BRL
P-9	Caulk	Windows	3540C/8082A / Arcolor 1016	BRL
			3540C/8082A / Arcolor 1221	BRL
			3540C/8082A / Arcolor 1232	BRL
			3540C/8082A / Arcolor 1242	BRL
			3540C/8082A / Arcolor 1248	BRL
			3540C/8082A / Arcolor 1254	BRL
			3540C/8082A / Arcolor 1260	BRL
P-10	Paint (black, white, and red)	Stairs and handrails	3540C/8082A / Arcolor 1016	BRL
			3540C/8082A / Arcolor 1221	BRL
			3540C/8082A / Arcolor 1232	BRL
			3540C/8082A / Arcolor 1242	BRL
			3540C/8082A / Arcolor 1248	BRL
			3540C/8082A / Arcolor 1254	BRL
			3540C/8082A / Arcolor 1260	BRL



Summary of PCB Results				
Sample No.	Material Type	Material Location	Method / Parameter	Result (ppm)
P-11	Paint (yellow)	Last stair at each landing	3540C/8082A / Arcolor 1016	BRL
			3540C/8082A / Arcolor 1221	BRL
			3540C/8082A / Arcolor 1232	BRL
			3540C/8082A / Arcolor 1242	BRL
			3540C/8082A / Arcolor 1248	BRL
			3540C/8082A / Arcolor 1254	BRL
			3540C/8082A / Arcolor 1260	BRL
P-12	Paint (black)	Entry doors	3540C/8082A / Arcolor 1016	BRL
			3540C/8082A / Arcolor 1221	BRL
			3540C/8082A / Arcolor 1232	BRL
			3540C/8082A / Arcolor 1242	BRL
			3540C/8082A / Arcolor 1248	BRL
			3540C/8082A / Arcolor 1254	BRL
			3540C/8082A / Arcolor 1260	BRL
P-13	Paint (black)	Exterior	3540C/8082A / Arcolor 1016	BRL
			3540C/8082A / Arcolor 1221	BRL
			3540C/8082A / Arcolor 1232	BRL
			3540C/8082A / Arcolor 1242	BRL
			3540C/8082A / Arcolor 1248	BRL
			3540C/8082A / Arcolor 1254	0.15
			3540C/8082A / Arcolor 1260	0.086
P-14	Paint (white)	Exterior	3540C/8082A / Arcolor 1016	BRL
			3540C/8082A / Arcolor 1221	BRL
			3540C/8082A / Arcolor 1232	BRL
			3540C/8082A / Arcolor 1242	BRL
			3540C/8082A / Arcolor 1248	BRL
			3540C/8082A / Arcolor 1254	1.4
			3540C/8082A / Arcolor 1260	0.91
P-15	Paint (black, green, white, red, yellow)	Center support of staircase	3540C/8082A / Arcolor 1016	BRL
			3540C/8082A / Arcolor 1221	BRL
			3540C/8082A / Arcolor 1232	BRL
			3540C/8082A / Arcolor 1242	BRL
			3540C/8082A / Arcolor 1248	BRL
			3540C/8082A / Arcolor 1254	0.061
			3540C/8082A / Arcolor 1260	0.072

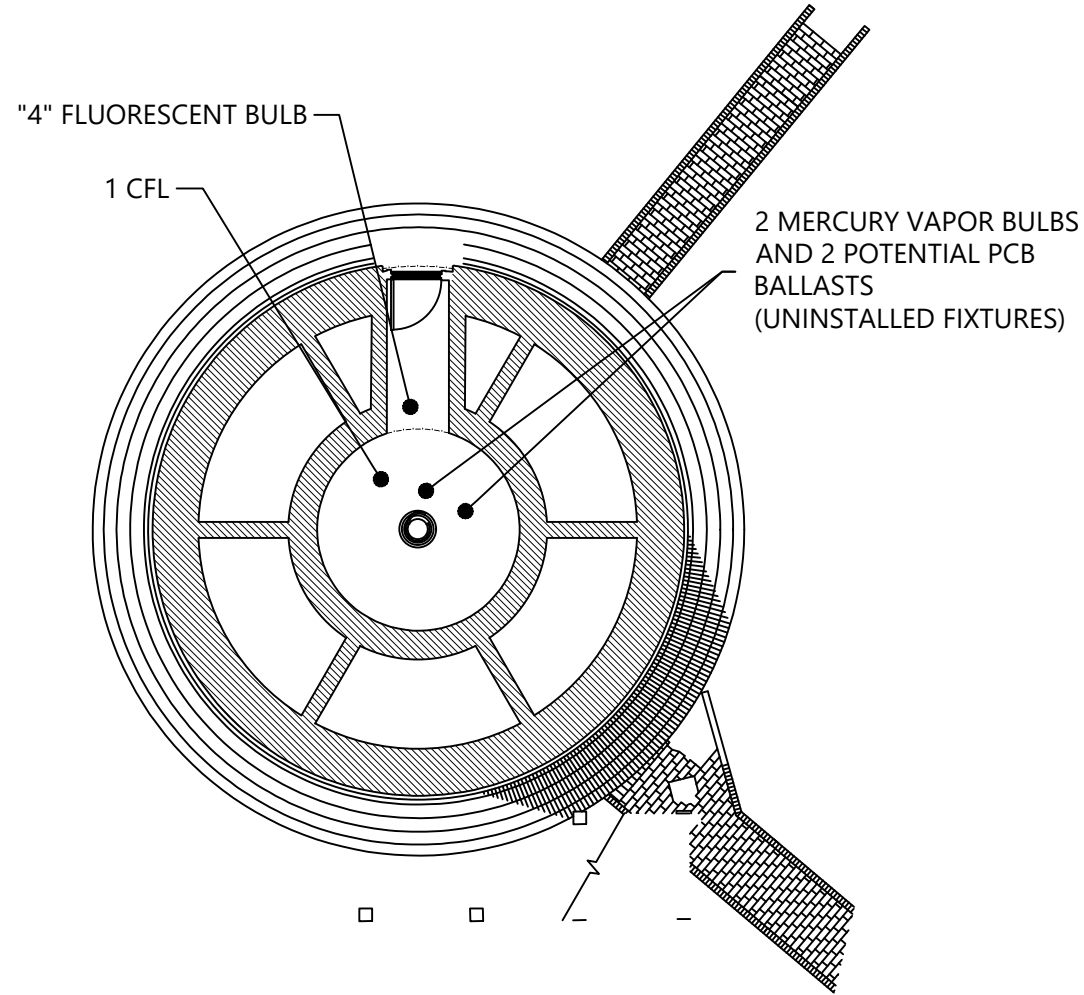


Summary of PCB Results				
Sample No.	Material Type	Material Location	Method / Parameter	Result (ppm)
P-16	Paint (green)	I-beam and ceiling of first landing level	3540C/8082A / Arcolor 1016	BRL
			3540C/8082A / Arcolor 1221	BRL
			3540C/8082A / Arcolor 1232	BRL
			3540C/8082A / Arcolor 1242	BRL
			3540C/8082A / Arcolor 1248	BRL
			3540C/8082A / Arcolor 1254	BRL
			3540C/8082A / Arcolor 1260	BRL
P-17	Paint (black)	Exterior metal rail and door	3540C/8082A / Arcolor 1016	BRL
			3540C/8082A / Arcolor 1221	BRL
			3540C/8082A / Arcolor 1232	BRL
			3540C/8082A / Arcolor 1242	BRL
			3540C/8082A / Arcolor 1248	BRL
			3540C/8082A / Arcolor 1254	BRL
			3540C/8082A / Arcolor 1260	BRL
P-18	Paint (white)	Wooden windows	3540C/8082A / Arcolor 1016	BRL
			3540C/8082A / Arcolor 1221	BRL
			3540C/8082A / Arcolor 1232	BRL
			3540C/8082A / Arcolor 1242	BRL
			3540C/8082A / Arcolor 1248	BRL
			3540C/8082A / Arcolor 1254	BRL
			3540C/8082A / Arcolor 1260	BRL

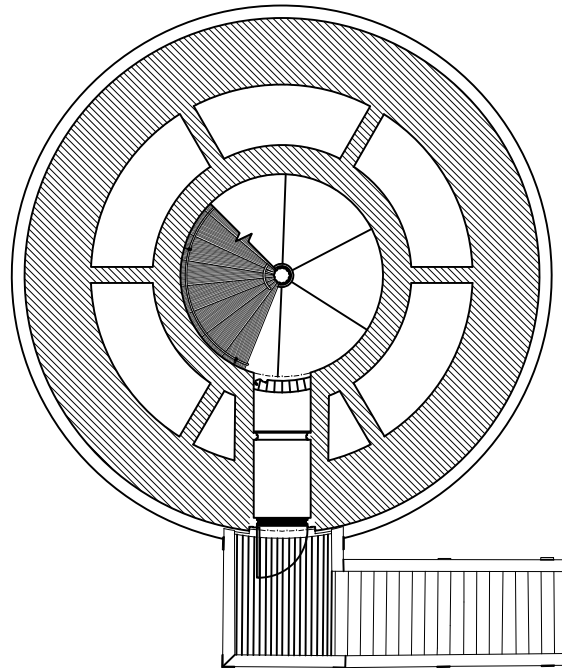
BRL - Below Reporting Limit

Appendix II – Diagrams of Confirmed Hazardous Building Materials Locations

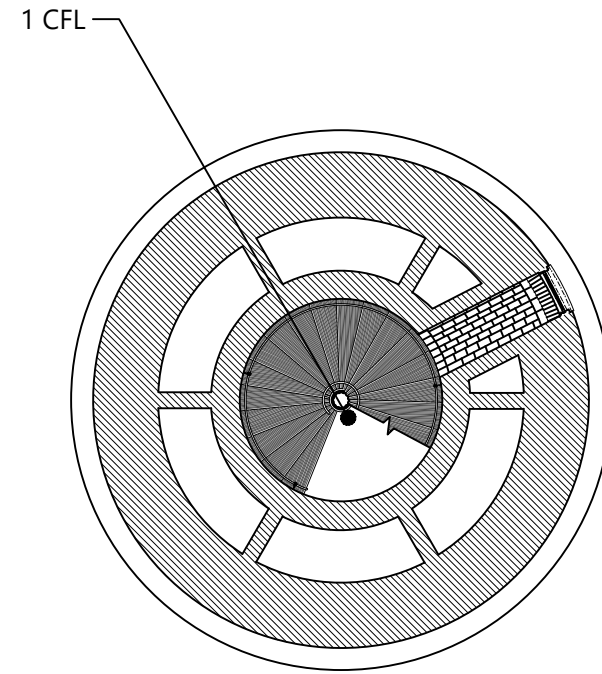
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FIRST LANDING PLAN



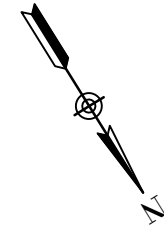
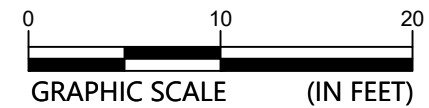
SECOND LANDING PLAN



SECOND WINDOW LEVEL PLAN

LEAD-BASED PAINT ($\geq 0.5\%$ WT)

- BLACK PAINT ON CENTER STAIRWAY SUPPORTS/CONDUIT (1.2% WT)
- GREEN PAINT ON STRUCTURAL STEEL AND CEILING OF FIRST LANDING LEVEL (10% WT)
- WHITE PAINT ON STRUCTURAL STEEL AND COMPONENTS OF NINTH LANDING LEVEL (8% WT)
- BLACK PAINT ON METAL STAIRS AND HANDRAILS ON INTERIOR STAIRS (0.91% WT)



HAZARDOUS BUILDING MATERIAL ASSESSMENT

CAPE LOOKOUT LIGHTHOUSE
CAPE LOOKOUT NATIONAL SEASHORE
HARKERS ISLAND, NORTH CAROLINA

SCALE:

AS SHOWN

DATE:

11-08-20222

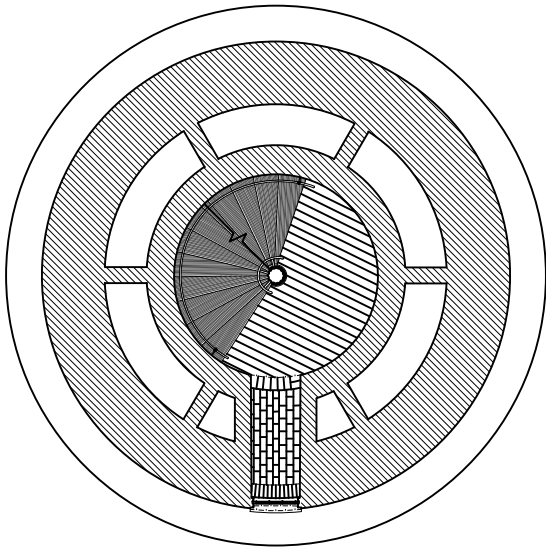
PROJECT NUMBER

22130469

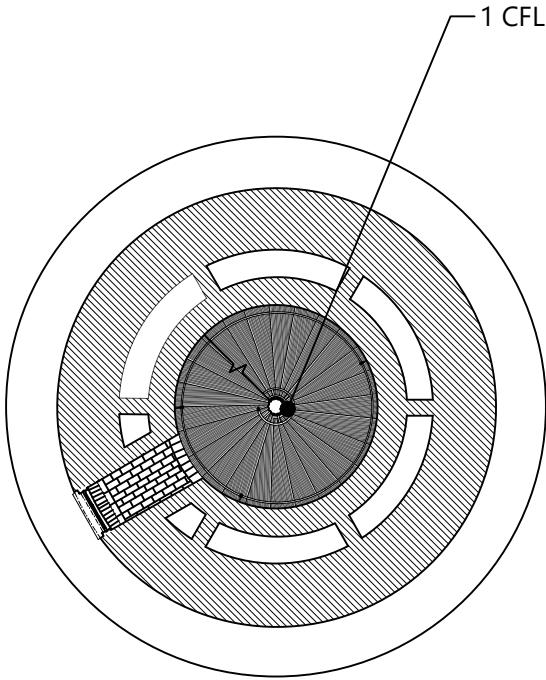
FIGURE NO.

1

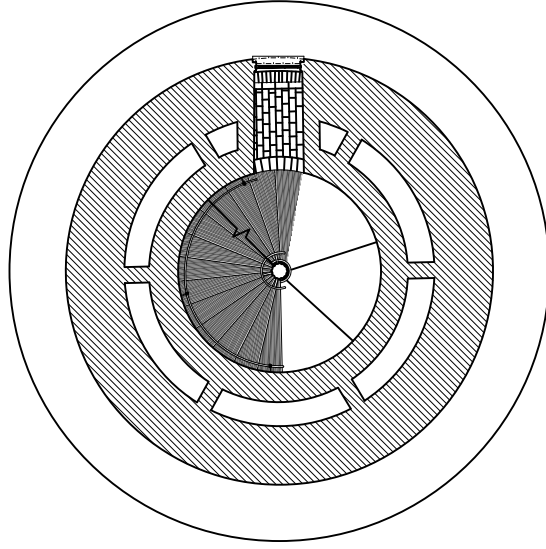
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THIRD LANDING PLAN



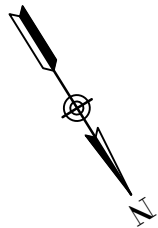
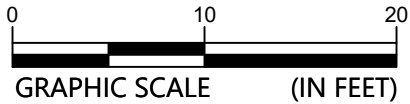
THIRD WINDOW LEVEL PLAN



FOURTH LANDING PLAN

LEAD-BASED PAINT ($\geq 0.5\%$ WT)

- BLACK PAINT ON CENTER STAIRWAY SUPPORTS/CONDUIT (1.2% WT)
- GREEN PAINT ON STRUCTURAL STEEL AND CEILING OF FIRST LANDING LEVEL (10% WT)
- WHITE PAINT ON STRUCTURAL STEEL AND COMPONENTS OF NINTH LANDING LEVEL (8% WT)
- BLACK PAINT ON METAL STAIRS AND HANDRAILS ON INTERIOR STAIRS (0.91% WT)



HAZARDOUS BUILDING MATERIAL ASSESSMENT

CAPE LOOKOUT LIGHTHOUSE
CAPE LOOKOUT NATIONAL SEASHORE
HARKERS ISLAND, NORTH CAROLINA

SCALE:

AS SHOWN

DATE:

11-08-20222

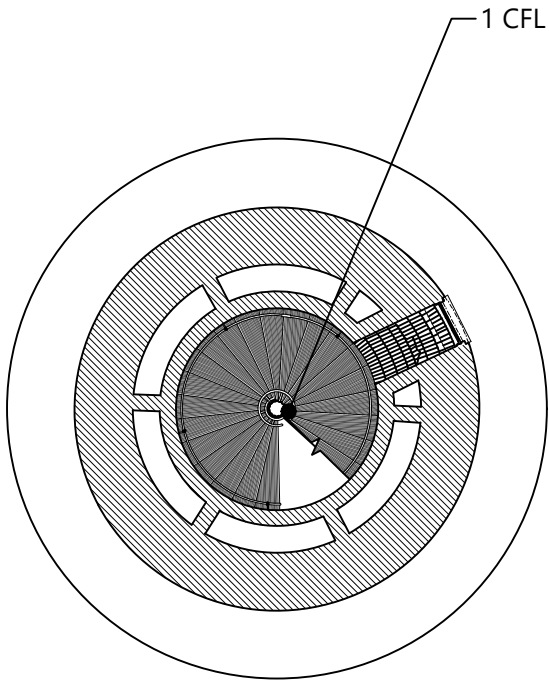
PROJECT NUMBER

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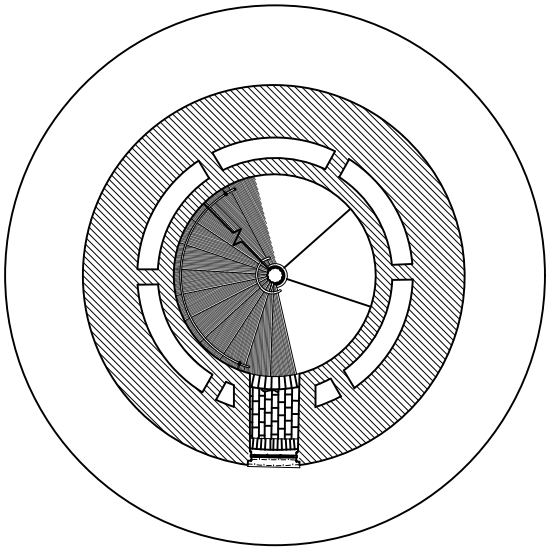
FIGURE NO.

2

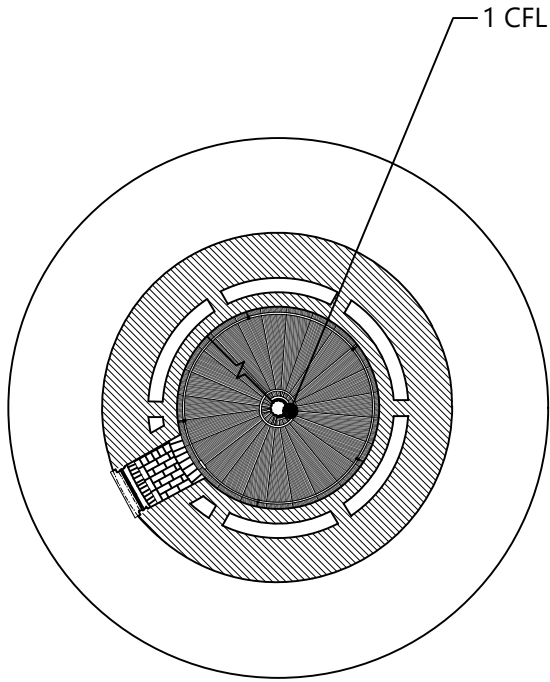
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FOURTH WINDOW LEVEL PLAN



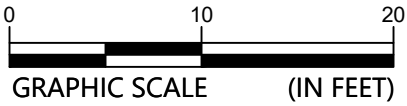
FIFTH LANDING PLAN



FIFTH WINDOW LEVEL PLAN

LEAD-BASED PAINT ($\geq 0.5\%$ WT)

- BLACK PAINT ON CENTER STAIRWAY SUPPORTS/CONDUIT (1.2% WT)
- GREEN PAINT ON STRUCTURAL STEEL AND CEILING OF FIRST LANDING LEVEL (10% WT)
- WHITE PAINT ON STRUCTURAL STEEL AND COMPONENTS OF NINTH LANDING LEVEL (8% WT)
- BLACK PAINT ON METAL STAIRS AND HANDRAILS ON INTERIOR STAIRS (0.91% WT)



GRAPHIC SCALE (IN FEET)



HAZARDOUS BUILDING MATERIAL ASSESSMENT

CAPE LOOKOUT LIGHTHOUSE
CAPE LOOKOUT NATIONAL SEASHORE
HARKERS ISLAND, NORTH CAROLINA

SCALE:

AS SHOWN

DATE:

11-08-20222

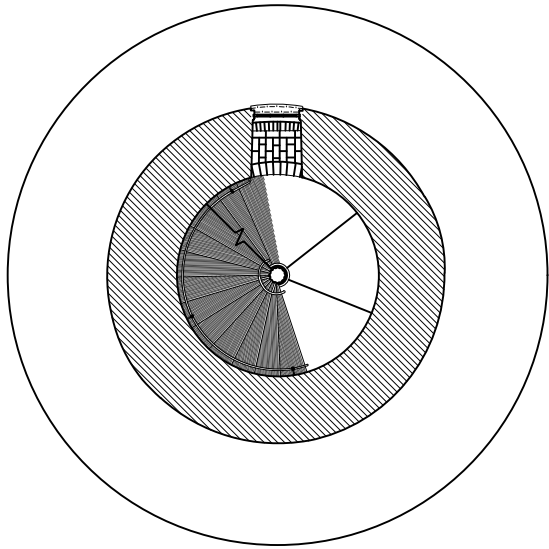
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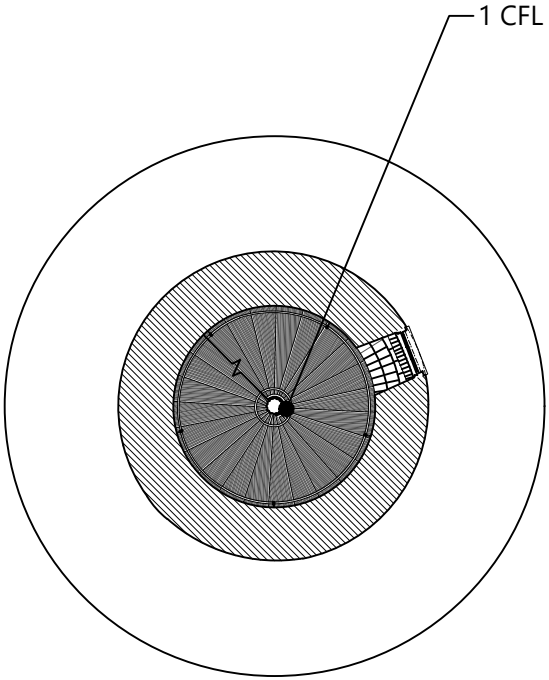
FIGURE NO.

3

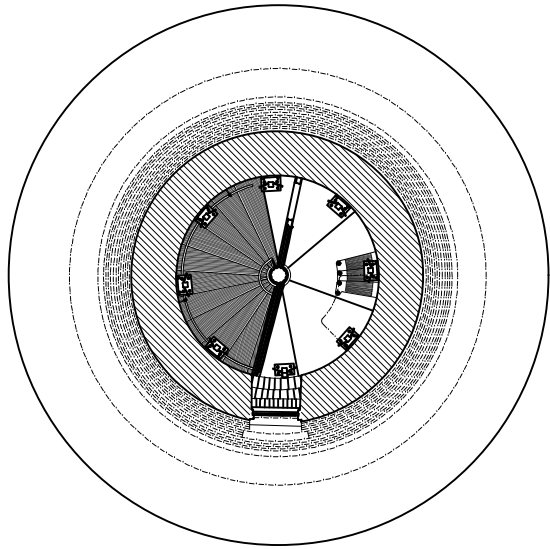
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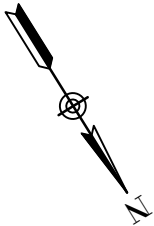
SIXTH LANDING PLAN



SIXTH WINDOW LEVEL PLAN

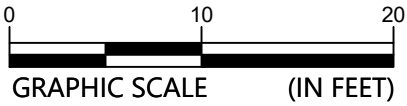


SEVENTH LANDING PLAN



LEAD-BASED PAINT ($\geq 0.5\%$ WT)

- BLACK PAINT ON CENTER STAIRWAY SUPPORTS/CONDUIT (1.2% WT)
- GREEN PAINT ON STRUCTURAL STEEL AND CEILING OF FIRST LANDING LEVEL (10% WT)
- WHITE PAINT ON STRUCTURAL STEEL AND COMPONENTS OF NINTH LANDING LEVEL (8% WT)
- BLACK PAINT ON METAL STAIRS AND HANDRAILS ON INTERIOR STAIRS (0.91% WT)



GRAPHIC SCALE (IN FEET)



HAZARDOUS BUILDING MATERIAL ASSESSMENT

CAPE LOOKOUT LIGHTHOUSE
CAPE LOOKOUT NATIONAL SEASHORE
HARKERS ISLAND, NORTH CAROLINA

SCALE:

AS SHOWN

DATE:

11-08-20222

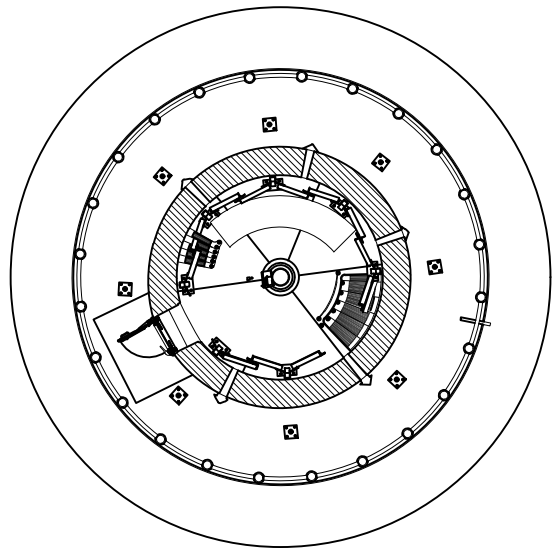
PROJECT NUMBER

22130469

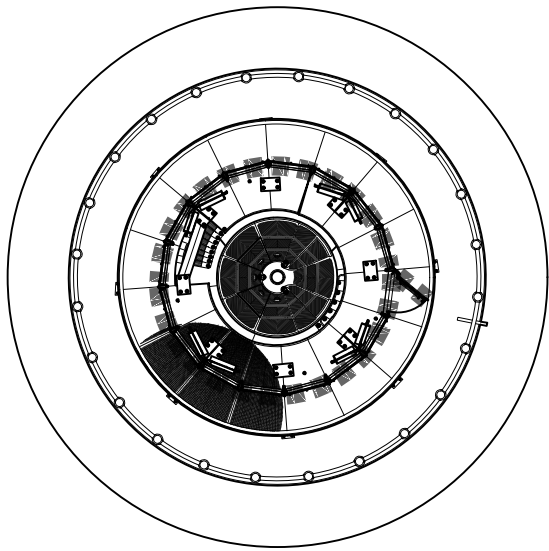
FIGURE NO.

4

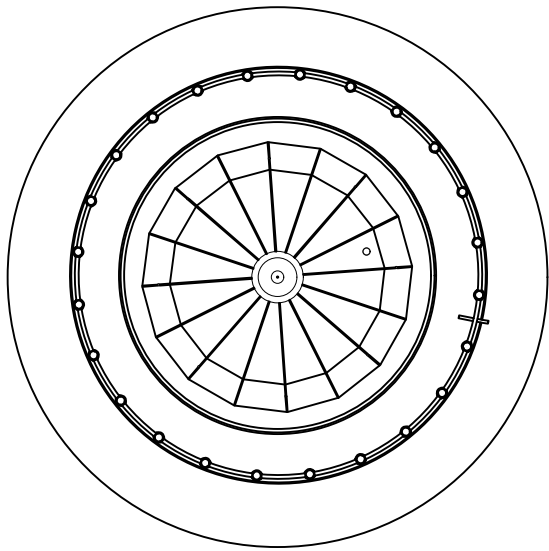
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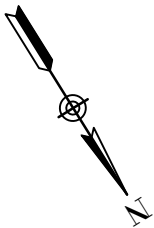
EIGHTH LANDING PLAN



NINTH LANDING PLAN



ROOF PLAN

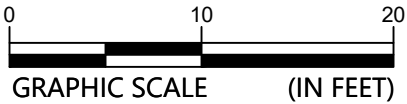


LEAD-BASED PAINT ($\geq 0.5\%$ WT)

- BLACK PAINT ON CENTER STAIRWAY SUPPORTS/CONDUIT (1.2% WT)
- GREEN PAINT ON STRUCTURAL STEEL AND CEILING OF FIRST LANDING LEVEL (10% WT)
- WHITE PAINT ON STRUCTURAL STEEL AND COMPONENTS OF NINTH LANDING LEVEL (8% WT)
- BLACK PAINT ON METAL STAIRS AND HANDRAILS ON INTERIOR STAIRS (0.91% WT)

ASSUMED ASBESTOS CONTAINING MATERIALS

■ ■ ■ ■ EXTERIOR WINDOW GLAZING
APPROXIMATELY 600 LINEAR FEET



HAZARDOUS BUILDING MATERIAL ASSESSMENT

CAPE LOOKOUT LIGHTHOUSE
CAPE LOOKOUT NATIONAL SEASHORE
HARKERS ISLAND, NORTH CAROLINA

SCALE:

AS SHOWN

DATE:

11-08-20222

PROJECT NUMBER

22130469

FIGURE NO.

5

Appendix III – Site Photographs



1 Exterior view of the Cape Lookout Lighthouse.



2 Interior view of the 9th landing level.



3 View of the inaccessible window glazing located on the exterior of the windows on the 9th landing level. The window glazing is presumed to contain asbestos.



4 The white caulk located between the structural steel and brick on the 8th landing level tested negative for asbestos.



5 The block filler coating tested negative for asbestos and PCBs.



6 Various caulks associated with the structure tested negative for asbestos and PCBs.



7 The metal central stairway support/conduit located on all levels tested positive for lead-based paint (1.2% wt).



8 The metal ceiling and structural steel on the first landing level tested positive for lead-based paint (10% wt).



9 White structural steel located on the 9th landing level tested positive for lead-based paint (8% wt).



10 The black metal handrails and interior stairs tested positive for lead-based paint (0.91% wt).



11 View of light fixture containing a CFL bulb.



12 View of small fluorescent bulb located on the first landing level with an electronic ballast.



13 View of two light fixtures with potential mercury vapor bulbs. The ballasts associated with the fixtures are presumed to contain PCBs.



15 View of a LED light fixture located on the second landing level.



14 View of the LED light associated with the lighthouse.



16 Additional view of the interior of the building.

Appendix IV - Copy of Inspector's License/Accreditation



NC DEPARTMENT OF
**HEALTH AND
HUMAN SERVICES**

ROY COOPER • Governor

MANDY COHEN, MD, MPH • Secretary

MARK T. BENTON • Assistant Secretary for Public Health,
Division of Public Health

February 18, 2022

Benjamin C Best
501 Long Leaf Acres Dr
Wilmington, NC 28405

Dear Mr. Best:

Based upon the review of your accreditation application, the Health Hazards Control Unit (HHCU) has determined that you have fulfilled the requirements and are eligible for asbestos accreditation as a(n) INSPECTOR. Your assigned North Carolina accreditation number is 12997, which is reflected on your enclosed North Carolina Accreditation card. Please be sure to take this card with you to any asbestos work site where you are employed. The State requires that all persons conducting asbestos abatement or asbestos management activities be accredited and have their identification card on site.

Your North Carolina Inspector accreditation will expire on FEBRUARY 28, 2023. It is NOT the policy of the HHCU to issue renewal notices. If you wish to continue working as a(n) Inspector after this expiration date, you must successfully complete the required training and submit a completed application to this office prior to February 28, 2023. If you should continue to perform asbestos management activities as a(n) Inspector without a valid North Carolina accreditation, you will be in violation of State regulations and may be cited for noncompliance.

Sincerely,

Ed Norman
Program Manager
Health Hazards Control Unit



Benjamin C Best
501 Long Leaf Acres Dr
Wilmington, NC 28405

135330

North Carolina Asbestos Accreditation			
EXPIRATION			
02-28-2023			
DOB	SEX	HT	WT
06-01-1992	M	5'8"	140
CLASS	#	EXP	
AIR MONITOR	80890	09-22	
INSPECTOR	12997	02-23	

NC DEPARTMENT OF HEALTH AND HUMAN SERVICES • DIVISION OF PUBLIC HEALTH



LOCATION: 5505 Six Forks Road, Building 1, Raleigh, NC 27609
MAILING ADDRESS: 1912 Mail Service Center, Raleigh, NC 27699-1912
www.ncdhhs.gov . TEL: 919-707-5950 . FAX: 919-870-4808

AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER

**Appendix V – Asbestos, Lead and PCB Laboratory Results
and Chain of Custody Records**



EMSL Analytical, Inc.

10801 Southern Loop Blvd Pineville, NC 28134

Tel/Fax: (704) 525-2205 / (704) 525-2382

<http://www.EMSL.com> / charlottelab@emsl.com

EMSL Order: 412211158

Customer ID: S&ME50

Customer PO:

Project ID:

Attention: Travis Knight
S&ME, Inc.
134 Suber Rd.
Columbia, SC 29210

Phone: (803) 561-9024

Fax: (803) 561-9177

Received Date: 10/31/2022 9:30 AM

Analysis Date: 11/02/2022

Collected Date:

Project: Cape Lookout

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
WG-1 412211158-0001	Windows-Second Window Lul - Window Glazing	Gray/White Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
WG-2 412211158-0002	Windows-6th Landing - Window Glazing	Gray/White Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
WG-3 412211158-0003	Windows-5th Landing - Window Glazing	White Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
BF-1 412211158-0004	Ext. W. Side - Block Filler	Gray/White Non-Fibrous Homogeneous		10% Ca Carbonate 90% Non-fibrous (Other)	None Detected
BF-2 412211158-0005	Ext. E. Side - Block Filler	Gray/White/Black Non-Fibrous Homogeneous		10% Ca Carbonate 90% Non-fibrous (Other)	None Detected
BF-3 412211158-0006	8th Landing- Small Area - Block Filler	Gray/White Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
BF-4 412211158-0007	Int. At Entry Door - Block Filler	White Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
BF-5 412211158-0008	Int. At Entry Door - Block Filler	Gray/Tan/Red Non-Fibrous Homogeneous		10% Quartz 90% Non-fibrous (Other)	None Detected
BF-6 412211158-0009	Ext. S Side - Block Filler	Tan/White/Red Non-Fibrous Homogeneous		15% Quartz 85% Non-fibrous (Other)	None Detected
BF-7 412211158-0010	Ext. W Side - Block Filler	Gray/Red/Black Non-Fibrous Homogeneous		10% Quartz 90% Non-fibrous (Other)	None Detected
C-1-Gray Caulk 412211158-0011	Ext. Storage Door - Gray Caulk	Gray Non-Fibrous Homogeneous		10% Ca Carbonate 90% Non-fibrous (Other)	None Detected
C-1-Black Caulk 412211158-0011A	Ext. Storage Door - Gray Caulk	Black Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
C-2-Gray Caulk 412211158-0012	Ext. Storage Door - Gray Caulk	Gray Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
C-2-Black Caulk 412211158-0012A	Ext. Storage Door - Gray Caulk	Black Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
C-3-Gray Caulk 412211158-0013	Ext. Storage Door - Gray Caulk	Gray Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
C-3-Black Caulk 412211158-0013A	Ext. Storage Door - Gray Caulk	Black Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected

Initial report from: 11/02/2022 16:11:51



EMSL Analytical, Inc.

10801 Southern Loop Blvd Pineville, NC 28134

Tel/Fax: (704) 525-2205 / (704) 525-2382

<http://www.EMSL.com> / charlottelab@emsl.com

EMSL Order: 412211158

Customer ID: S&ME50

Customer PO:

Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
C-4-White Caulk 412211158-0014	Ext. Main Door - White/Clear Caulk	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
C-4-Clear Caulk 412211158-0014A	Ext. Main Door - White/Clear Caulk	Clear Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
C-5-White Caulk 412211158-0015	Ext. Main Door - White/Clear Caulk	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
C-5-Clear Caulk 412211158-0015A	Ext. Main Door - White/Clear Caulk	Clear Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
C-6-White Caulk 412211158-0016	Ext. Main Door - White/Clear Caulk	White Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
C-6-Clear Caulk 412211158-0016A	Ext. Main Door - White/Clear Caulk	Clear Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
M-1 412211158-0017	Storage RM - Brick Mortar	Gray/Red Non-Fibrous Homogeneous		15% Quartz 85% Non-fibrous (Other)	None Detected
M-2 412211158-0018	8th Landing - Brick Mortar	Gray Non-Fibrous Homogeneous		35% Quartz 65% Non-fibrous (Other)	None Detected
M-3-Brick 412211158-0019	5th Landing - Brick Mortar	Red Non-Fibrous Homogeneous		10% Ca Carbonate 90% Non-fibrous (Other)	None Detected
M-3-Mortar 412211158-0019A	5th Landing - Brick Mortar	Gray Non-Fibrous Homogeneous		15% Quartz 85% Non-fibrous (Other)	None Detected
C-7 412211158-0020	8th Landing BTWN Steel & Brick - White Caulk	White Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
C-8 412211158-0021	8th Landing BTWN Steel & Brick - White Caulk	White/Black Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
C-9-Caulk 412211158-0022	8th Landing BTWN Steel & Brick - White Caulk	White Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
C-9-Roofing 412211158-0022A	8th Landing BTWN Steel & Brick - White Caulk	Black Fibrous Homogeneous	60% Cellulose	40% Non-fibrous (Other)	None Detected
M-4 412211158-0023	Around Metal Frame Door 8th Landing - Mortar	Gray Non-Fibrous Homogeneous		15% Quartz 85% Non-fibrous (Other)	None Detected
M-5 412211158-0024	Mortar	Gray Non-Fibrous Homogeneous		25% Quartz 75% Non-fibrous (Other)	None Detected
M-6 412211158-0025	Mortar	Gray Non-Fibrous Homogeneous		20% Quartz 80% Non-fibrous (Other)	None Detected
C-11-Caulk 412211158-0026	Int. Windows-6th Landing - White Caulk	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
C-11-Insulation 412211158-0026A	Int. Windows-6th Landing - White Caulk	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Initial report from: 11/02/2022 16:11:51



EMSL Analytical, Inc.

10801 Southern Loop Blvd Pineville, NC 28134

Tel/Fax: (704) 525-2205 / (704) 525-2382

<http://www.EMSL.com> / charlottelab@emsl.com

EMSL Order: 412211158

Customer ID: S&ME50

Customer PO:

Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
C-12-Caulk 412211158-0027	Int. Windows- 5th Landing - White Caulk	White Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
C-12-Insulation 412211158-0027A	Int. Windows- 5th Landing - White Caulk	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
C-13-Caulk 412211158-0028	Int. Windows-2nd Window - White Caulk	White Non-Fibrous Homogeneous		10% Ca Carbonate 90% Non-fibrous (Other)	None Detected
C-13-Insulation 412211158-0028A	Int. Windows-2nd Window - White Caulk	Gray Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
QC-C-9 412211158-0029	8th Land BTWN Steel & Brick - White Caulk	White/Black Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
QC-M-4 412211158-0030	8th Land obs. Door - Mortar	Gray Non-Fibrous Homogeneous		35% Quartz 65% Non-fibrous (Other)	None Detected

Analyst(s)

Ashley Hill (15)

Brant Alyea (26)

Lee Plumley, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Pineville, NC NVLAP Lab Code 200841-0, VA 3333 00312

Initial report from: 11/02/2022 16:11:51

Project Information

Turn-Around-Time (TAT)

Please call ahead for large projects and/or turnaround times 6 Hours or Less. *32 Hour TAT available for select tests only; samples must be submitted by 11:30am

Test Selection

TEM - Bulk

☐ TEM EPA NOB

☐ NYS NOB 198.4 (Non-Friable - NY)

☐ TEM EPA 600/R-93/116 w Milling Prep (0.1%)

Other Tests (please specify)

☐ Positive Stop - Clearly Identified Homogeneous Areas (HA)

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)	
--	--

Controlled Document - Asbestos Bulk R7 9/14/2021

☐ **AGREE TO ELECTRONIC SIGNATURE** (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.

BULK SAMPLE

CHAIN OF CUSTODY RECORD



Requested Turn Around Time:			<input type="checkbox"/> Same Day
<input type="checkbox"/> 24-Hour	<input type="checkbox"/> 48-Hour	<input checked="" type="checkbox"/> 3 Day	<input type="checkbox"/> 6-10 Day

PROJECT NO. 22130469		PROJECT NAME: Cape Lookout		RELINQUISHED BY:		DATE	TIME
FACILITY C. 34th Ave		DATE TAKEN 2/9/22 - 28/22		RECEIVED BY:		DATE	TIME
SAMPLER(S) 76 / 33		NOTES:					
SAMPLE #	LAB NUMBER	MATERIAL	LOCATION	QUANTITY	COMMENTS / SPECIAL INSTRUCTIONS		
WG-1		Window Clearing	Windows - Second window level				
2			- 6th landing				
3			- 5th landing				
BF-1		Block Filler	Ext. W. Side				
2			Ext. E. Side				
3			8th landing - Small Area				
4			Int. At Entry door (house)				
5							
6			Ext. S. Side				
7			Ext. W. Side				
C-1		Grey Ceck	Ext. Storage Door	~25LF			
2							
3							
C-1		White/Clear Ceck	Ext. Main Door	~25LF			
5							
6							
M-1		Brick Mortar	Storage 127				
2			8th landing				
3			5th landing				

CHAIN OF CUSTODY RECORD

Requested Turn Around Time:		<input type="checkbox"/> Same Day
<input type="checkbox"/> 24-Hour	<input type="checkbox"/> 48-Hour	<input type="checkbox"/> 3 Day
		<input type="checkbox"/> 6-10 Day

[illegible]

**EMSL Analytical, Inc.**

10801 Southern Loop Blvd, Pineville, NC 28134

Phone/Fax: (704) 525-2205 / (704) 525-2382

<http://www.EMSL.com>charlottelab@emsl.com

EMSL Order: 412211157

CustomerID: SMEI54

CustomerPO: 22130469

ProjectID:

Attn: **Travis Knight**
S&ME, Inc.
9751 Southern Pine Blvd.
Charlotte, NC 28273

Phone: (704) 940-1830
Fax: (704) 565-4929
Received: 10/31/2022 09:30 AM
Collected:

Project: **Cape Lookout****Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)***

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Weight</i>	<i>Lead Concentration</i>
Pb-01	412211157-0001	11/1/2022		.2129 g	0.049 % wt
Desc: Black on Ext					
Pb-02	412211157-0002	11/1/2022		.2702 g	0.029 % wt
Desc: White On Ext					
Pb-03	412211157-0003	11/1/2022		.2491 g	1.2 % wt
Desc: Storage Room Center Support					
Pb-04	412211157-0004	11/1/2022		.2514 g	10 % wt
Desc: Green on I-Beam/Ceiling in Storage Room					
Pb-05	412211157-0005	11/1/2022		.2285 g	8.0 % wt
Desc: White-Steel on 9th Landing					
Pb-06	412211157-0006	11/1/2022		.2283 g	0.081 % wt
Desc: Gray Stairs on 8th Landing					
Pb-07	412211157-0007	11/1/2022		.2433 g	0.12 % wt
Desc: White Cabinet on 8th Land					
Pb-08	412211157-0008	11/1/2022		.2672 g	0.40 % wt
Desc: Black on Ceiling on 7th Land					
Pb-09	412211157-0009	11/1/2022		.2227 g	0.91 % wt
Desc: Handrail on 6th Land					
Pb-10	412211157-0010	11/1/2022		.2290 g	0.083 % wt
Desc: Yellow Last Stair on 5th Land					
Pb-11	412211157-0011	11/1/2022		.2285 g	0.026 % wt
Desc: White On Window 5th Land					
Pb-12	412211157-0012	11/1/2022		.2172 g	<0.0092 % wt
Desc: Blk Metal Door @ Entry					
Pb-13	412211157-0013	11/1/2022		.2245 g	<0.0089 % wt
Desc: Blk Metal Handrail Obs. Dec					

Aaron Hartley, Lead Technical Manager
or other approved signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted.

* Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.

Samples analyzed by EMSL Analytical, Inc. Pineville, NC AIHA-LAP, LLC - ELLAP 192283

Initial report from 11/02/2022 07:56:47



EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Lead Chain of Custody

EMSL Order Number / Lab Use Only

412211157

EMSL Analytical, Inc.

10801 Southern Loop Blvd

Pineville, NC 28134

PHONE: (704) 525-2205

EMAIL: charlottelab@EMSL.com

Customer Information	Customer ID:			Billing ID:																																																																																																																					
	Company Name: S&ME, Inc.			Company Name: S&ME, Inc.																																																																																																																					
	Contact Name: Travis Knight			Billing Contact: AP																																																																																																																					
	Street Address: 134 Suber Rd.			Street Address: 134 Suber Rd.																																																																																																																					
	City, State, Zip: Columbia SC 29210 Country: US			City, State, Zip: Columbia SC 29210 Country: US																																																																																																																					
	Phone: 803-561-9024			Phone: 803-561-9024																																																																																																																					
	Email(s) for Report: tknight@smeinc.com			Email(s) for Invoice:																																																																																																																					
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Project Name/No: Cape Lookout				Purchase Order: 22130469																																																																																																																					
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Sampled By Name: <i>Travis Knight</i>			Sampled By Signature: <i>[Signature]</i>			No. of Samples in Shipment																																																																																																																			
<div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> 3 Hour <input type="checkbox"/> 6 Hour <input type="checkbox"/> 24 Hour <input type="checkbox"/> 32 Hour <input type="checkbox"/> 48 Hour <input checked="" type="checkbox"/> 72 Hour <input type="checkbox"/> 96 Hour <input type="checkbox"/> 1 Week <input type="checkbox"/> 2 Week </div> <div> Turn-Around-Time (TAT) <small>Please call ahead for large projects and/or turnaround times 6 Hours or Less. *32 Hour TAT available for select tests only; samples must be submitted by 11:30am.</small> </div> </div>																																																																																																																									
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mg/L (ppm)</td> <td><input type="checkbox"/></td> </tr> <tr> <td> Wastewater Unpreserved <input type="checkbox"/> Preserved with HNO3 <input type="checkbox"/> PH<2 </td> <td>EPA 200.7</td> <td>ICP-OES</td> <td>0.020 mg/L (ppm)</td> <td><input type="checkbox"/></td> </tr> <tr> <td rowspan="3">Drinking Water</td> <td>EPA 200.5</td> <td>ICP-OES</td> <td>0.003 mg/L (ppm)</td> <td><input type="checkbox"/></td> </tr> <tr> <td>Unpreserved <input type="checkbox"/></td> <td></td> <td></td> <td><input type="checkbox"/></td> </tr> <tr> <td>Preserved with HNO3 <input type="checkbox"/> PH<2</td> <td>EPA 200.8</td> <td>ICP-MS</td> <td>0.001 mg/L (ppm)</td> <td><input type="checkbox"/></td> </tr> <tr> <td>TSP/SPM Filter</td> <td>40 CFR Part 50</td> <td>ICP-OES</td> <td>12 µg/filter</td> <td><input type="checkbox"/></td> </tr> <tr> <td colspan="5">Other:</td> <td><input type="checkbox"/></td> </tr> </tbody> </table>							MATRIX	METHOD	INSTRUMENT	REPORTING LIMIT	SELECTION	CHIPS <input checked="" 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/ SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	<input type="checkbox"/>	SW 846-1312 / SW 846-6010D*	ICP-OES	0.1 mg/L (ppm)	<input type="checkbox"/>	TTLC	22 CCR App. II, 7000B	Flame Atomic Absorption	40mg/kg (ppm)	<input type="checkbox"/>	22 CCR App. II, SW 846-6010D*	ICP-OES	2mg/kg (ppm)	<input type="checkbox"/>	STLC	22 CCR App. II, 7000B	Flame Atomic Absorption	0.4 mg/L (ppm)	<input type="checkbox"/>	22 CCR App. II, SW 846-6010D*	ICP-OES	0.1 mg/L (ppm)	<input type="checkbox"/>	SW 846-7000B	Flame Atomic Absorption	40mg/kg (ppm)	<input type="checkbox"/>	Soil	SW 846-6010D*	ICP-OES	2mg/kg (ppm)	<input type="checkbox"/>	SM 3111B / SW 846-7000B	Flame Atomic Absorption	0.4 mg/L (ppm)	<input type="checkbox"/>	Wastewater Unpreserved <input type="checkbox"/> Preserved with HNO3 <input type="checkbox"/> PH<2	EPA 200.7	ICP-OES	0.020 mg/L (ppm)	<input type="checkbox"/>	Drinking Water	EPA 200.5	ICP-OES	0.003 mg/L (ppm)	<input type="checkbox"/>	Unpreserved <input type="checkbox"/>			<input type="checkbox"/>	Preserved with HNO3 <input type="checkbox"/> PH<2	EPA 200.8	ICP-MS	0.001 mg/L (ppm)	<input type="checkbox"/>	TSP/SPM Filter	40 CFR Part 50	ICP-OES	12 µg/filter	<input type="checkbox"/>	Other:					<input type="checkbox"/>
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TSP/SPM Filter	40 CFR Part 50	ICP-OES	12 µg/filter	<input type="checkbox"/>																																																																																																																					
Other:					<input type="checkbox"/>																																																																																																																				
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:20%;">Sample Number</th> <th style="width:40%;">Sample Location</th> <th style="width:20%;">Volume / Area</th> <th style="width:20%;">Date / Time Sampled</th> </tr> </thead> <tbody> <tr> <td></td> <td style="text-align: center; vertical-align: middle;"><i>SEE Following Page</i></td> <td></td> <td></td> </tr> <tr><td> </td><td></td><td></td><td></td></tr> <tr><td> </td><td></td><td></td><td></td></tr> <tr><td> </td><td></td><td></td><td></td></tr> <tr><td> </td><td></td><td></td><td></td></tr> <tr><td> </td><td></td><td></td><td></td></tr> </tbody> </table>							Sample Number	Sample Location	Volume / Area	Date / Time Sampled		<i>SEE Following Page</i>																																																																																																													
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Method of Shipment: FEDEX		Sample Condition Upon Receipt:																																																																																																																							
Relinquished by: <i>[Signature]</i>	Date/Time: <i>10/28/22 1600</i>	Received by: <i>[Signature]</i>	Date/Time: <i>10/31/22 EFY 0930</i>																																																																																																																						
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Controlled Document - CDC-25 Lead R16 4/19/2021

*6010C Available Upon Request

☐ **AGREE TO ELECTRONIC SIGNATURE** (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.

EMSL Order Number / Lab Use Only

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Additional Pages of the Chain of Custody are only necessary if needed for additional sample information

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

Method of Shipment: FED EX		Sample Condition Upon Receipt:	
Relinquished by: [Signature]	Date/Time: 10/28/22 16:00	Received by:	Date/Time
Relinquished by:	Date/Time:	Received by:	Date/Time

Controlled Document - COC-25 Lead R16 4/19/2021

☐ **AGREE TO ELECTRONIC SIGNATURE** (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.

ANALYTICAL REPORT

CLIENT

S&ME, Inc.
134 Suber Road
Columbia SC 29210

ATTENTION

Tom Behnke

PROJECT ID

Cape Lookout

LABORATORY REPORT NUMBER

2211023

DATE

November 07, 2022

Primary Data Review By



Chris Pafford

Project Manager, AES

Secondary Data Review By

Ashley Amick

Project Manager, Access Analytical
aamick@axs-inc.com

PLEASE NOTE:

- Unless otherwise noted, all analysis on this report performed at Analytical Environmental Services Inc. (AES Inc), 3080 Presidential Drive, Atlanta, GA 30340.
- AES is SCDHEC certified laboratory # 98016, NCDENR certified lab # 562, GA certified lab # FL-E87582, NELAP certified laboratory # E87582
- AIHA-LAP, LLC Laboratory ID: 100671 for Industrial Hygiene samples (Organics, Metals, PCM Asbestos, Gravimetric), Environmental Lead (Paint, Soil, Dust Wipes, Air), and Environmental Microbiology (Fungal) Direct Examination.
- Local support services for this project are provided by Access Analytical, Inc. Access Analytical is a representative of AES serving client in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 883.315.4243

Access Lab Report #: _____
Sub Lab (if applicable): _____ / Sub Report #: _____
Client Purchase Order #: _____
Access Estimate #: _____



ACCESS
ANALYTICAL, INC.

Access Analytical, Inc.
15 Thames Valley Rd. ~ Irmo, SC 29063
Phone: 803-781-4243 / Fax: 803-781-4303 / www.axs-inc.com
SCDHEC Lab Certification # 32571
NELAC Lab ID # E871145

Chain of Custody Record

2211023

Client:	SIME		Preservatives (see codes):	0		
Attn:	TAVIS Knight		Bottle Types (see codes):	G		
Address:	134 Suber Rd		REQUESTED LAB ANALYSIS: PCB (EPA-821A)			
City:	Columbia	State:		SC	Zip Code:	29210
Phone:	803-561-9624	Fax:		803-561-9177		
Email:	+Knight@SIME/NC.com					
Project Name:	CAPE Lookout					
Sampled By (Signature):						

Preservation Codes / Bottle Types:

*Preservative Codes:
0 = None, 1 = HCL, 2 = HNO3, 3 = H2SO4, 4 = NaOH, 5 = Na2S2O8, 6 = Method 5035 set w/ NaHSO4 & CH3OH, 7 = NaOH/ZnOAC, 8 = H3PO4, 9 = cooled to ≤6°C, 10 = cooled to ≤10°C, 11 = Amm.Cl-, 12 = Ascorbic Acid / HCL, 13 = EDA

*Matrix Codes:
GW = ground water, WW = waste water, DW = drinking water, SW = surface/storm water, S = soil, SL = sludge, A = air, IW = industrial waste, O = other (specify in comments section)

*Program Area Codes:
CWA = Clean Water Act (for wastewaters), SDWA = Safe Drinking Water Act (for drinking water), SHW = Solid and Hazardous Wastes (for soils, ground waters and waste samples)

*Container Type: G = Glass, P = Plastic

Notes / Comments

Lab ID:	Sample Name:	Date Collected:	Time Collected:	C-Comp G=Grab	Matrix (see codes)	Program Area (see codes)	Total # Containers	# Containers per Test >>
	P-1	10/27/22		L	O	SHW	1	1
	P-2						1	1
	P-3						1	1
	P-4						1	1
	P-5						1	1
	P-6						1	1
	P-7						1	1
	P-8						1	1
	P-9						1	1
	P-10						1	1

Turnaround Time Requested:	Project Location:	Relinquished By:	Received By:	Date:	Time (24hr):	Samples Received on Ice:
Standard	SC			10/31/22	1150	Y ___ N ___ N/A 1.0
Rush *	NC		fedex	10/31/22	1700	___ Y ___ N ___ N/A
*Date Required	Nov. 4, 2022	Other (Specify): Fedex				___ Y ___ N ___ N/A
Rush data emailed/faxed by end of business day on date required. Standard TAT is 7-10 business days.				11.01.22	0938	___ Y ___ N ___ N/A
Chain of Custody Page 1 of 2			Received in lab by:	Sample Temp. Received in Lab: 4.0 (°C) Ref: RT1 Ref: RT2		

White Copy: Lab original / Canary Copy: Client Copy

NOTE: Relinquishing samples via this Chain of Custody document constitutes client acceptance of Access Analytical terms and conditions.

[illegible]

Client: S&ME, Inc.
Project: Cape Lookout
Lab ID: 2211023

Case Narrative

PCBs Analysis by Method 8082A:

LCS-345647 recovery for surrogate, Decachlorobiphenyl, was outside control limits biased high.

Due to sample matrix, sample 2211023-001, -002, -005 through -010, -013, through -017 required dilution

Client: S&ME, Inc.
Project Name: Cape Lookout
Lab ID: 2211023-001

Client Sample ID: P-1
Collection Date: 10/27/2022
Matrix: Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
POLYCHLORINATED BIPHENYLS SW8082A					(SW3550C)			
Aroclor 1016	BRL	0.67		mg/Kg	345647	20	11/03/2022 19:57	ST
Aroclor 1221	BRL	0.67		mg/Kg	345647	20	11/03/2022 19:57	ST
Aroclor 1232	BRL	0.67		mg/Kg	345647	20	11/03/2022 19:57	ST
Aroclor 1242	BRL	0.67		mg/Kg	345647	20	11/03/2022 19:57	ST
Aroclor 1248	BRL	0.67		mg/Kg	345647	20	11/03/2022 19:57	ST
Aroclor 1254	BRL	0.67		mg/Kg	345647	20	11/03/2022 19:57	ST
Aroclor 1260	BRL	0.67		mg/Kg	345647	20	11/03/2022 19:57	ST
Surr: Decachlorobiphenyl	574	47.7-130	S	%REC	345647	1	11/02/2022 18:26	ST
Surr: Tetrachloro-m-xylene	73.5	50.1-130		%REC	345647	1	11/02/2022 18:26	ST

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value

- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- F Analyzed in the lab which is a deviation from the method
- < Less than Result value
- J Estimated value detected below Reporting Limit

Client: S&ME, Inc.
Project Name: Cape Lookout
Lab ID: 2211023-002

Client Sample ID: P-2
Collection Date: 10/27/2022
Matrix: Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
POLYCHLORINATED BIPHENYLS SW8082A					(SW3550C)			
Aroclor 1016	BRL	0.33		mg/Kg	345647	10	11/03/2022 16:12	ST
Aroclor 1221	BRL	0.33		mg/Kg	345647	10	11/03/2022 16:12	ST
Aroclor 1232	BRL	0.33		mg/Kg	345647	10	11/03/2022 16:12	ST
Aroclor 1242	BRL	0.33		mg/Kg	345647	10	11/03/2022 16:12	ST
Aroclor 1248	BRL	0.33		mg/Kg	345647	10	11/03/2022 16:12	ST
Aroclor 1254	BRL	0.33		mg/Kg	345647	10	11/03/2022 16:12	ST
Aroclor 1260	BRL	0.33		mg/Kg	345647	10	11/03/2022 16:12	ST
Surr: Decachlorobiphenyl	91	47.7-130		%REC	345647	10	11/03/2022 16:12	ST
Surr: Tetrachloro-m-xylene	53.7	50.1-130		%REC	345647	10	11/03/2022 16:12	ST

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value

- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- F Analyzed in the lab which is a deviation from the method
- < Less than Result value
- J Estimated value detected below Reporting Limit

Client: S&ME, Inc.
Project Name: Cape Lookout
Lab ID: 2211023-003

Client Sample ID: P-3
Collection Date: 10/27/2022
Matrix: Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
POLYCHLORINATED BIPHENYLS SW8082A					(SW3550C)			
Aroclor 1016	BRL	0.033		mg/Kg	345647	1	11/03/2022 16:23	ST
Aroclor 1221	BRL	0.033		mg/Kg	345647	1	11/03/2022 16:23	ST
Aroclor 1232	BRL	0.033		mg/Kg	345647	1	11/03/2022 16:23	ST
Aroclor 1242	BRL	0.033		mg/Kg	345647	1	11/03/2022 16:23	ST
Aroclor 1248	BRL	0.033		mg/Kg	345647	1	11/03/2022 16:23	ST
Aroclor 1254	BRL	0.033		mg/Kg	345647	1	11/03/2022 16:23	ST
Aroclor 1260	BRL	0.033		mg/Kg	345647	1	11/03/2022 16:23	ST
Surr: Decachlorobiphenyl	50	47.7-130		%REC	345647	1	11/03/2022 16:23	ST
Surr: Tetrachloro-m-xylene	40.7	50.1-130	S	%REC	345647	1	11/03/2022 16:23	ST

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value

- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- F Analyzed in the lab which is a deviation from the method
- < Less than Result value
- J Estimated value detected below Reporting Limit

Client: S&ME, Inc.
Project Name: Cape Lookout
Lab ID: 2211023-004

Client Sample ID: P-4
Collection Date: 10/27/2022
Matrix: Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
POLYCHLORINATED BIPHENYLS SW8082A					(SW3550C)			
Aroclor 1016	BRL	0.033		mg/Kg	345647	1	11/03/2022 16:34	ST
Aroclor 1221	BRL	0.033		mg/Kg	345647	1	11/03/2022 16:34	ST
Aroclor 1232	BRL	0.033		mg/Kg	345647	1	11/03/2022 16:34	ST
Aroclor 1242	BRL	0.033		mg/Kg	345647	1	11/03/2022 16:34	ST
Aroclor 1248	0.037	0.033		mg/Kg	345647	1	11/03/2022 16:34	ST
Aroclor 1254	BRL	0.033		mg/Kg	345647	1	11/03/2022 16:34	ST
Aroclor 1260	BRL	0.033		mg/Kg	345647	1	11/03/2022 16:34	ST
Surr: Decachlorobiphenyl	35.8	47.7-130	S	%REC	345647	1	11/03/2022 16:34	ST
Surr: Tetrachloro-m-xylene	34	50.1-130	S	%REC	345647	1	11/03/2022 16:34	ST

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value

- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- F Analyzed in the lab which is a deviation from the method
- < Less than Result value
- J Estimated value detected below Reporting Limit

Client: S&ME, Inc.
Project Name: Cape Lookout
Lab ID: 2211023-005

Client Sample ID: P-5
Collection Date: 10/27/2022
Matrix: Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
POLYCHLORINATED BIPHENYLS SW8082A					(SW3550C)			
Aroclor 1016	BRL	0.20		mg/Kg	345647	6	11/03/2022 16:46	ST
Aroclor 1221	BRL	0.20		mg/Kg	345647	6	11/03/2022 16:46	ST
Aroclor 1232	BRL	0.20		mg/Kg	345647	6	11/03/2022 16:46	ST
Aroclor 1242	BRL	0.20		mg/Kg	345647	6	11/03/2022 16:46	ST
Aroclor 1248	BRL	0.20		mg/Kg	345647	6	11/03/2022 16:46	ST
Aroclor 1254	BRL	0.20		mg/Kg	345647	6	11/03/2022 16:46	ST
Aroclor 1260	BRL	0.20		mg/Kg	345647	6	11/03/2022 16:46	ST
Surr: Decachlorobiphenyl	8.84	47.7-130	S	%REC	345647	1	11/02/2022 19:11	ST
Surr: Tetrachloro-m-xylene	6.94	50.1-130	S	%REC	345647	1	11/02/2022 19:11	ST

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value

- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- F Analyzed in the lab which is a deviation from the method
- < Less than Result value
- J Estimated value detected below Reporting Limit

Client: S&ME, Inc.
Project Name: Cape Lookout
Lab ID: 2211023-006

Client Sample ID: P-6
Collection Date: 10/27/2022
Matrix: Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
POLYCHLORINATED BIPHENYLS SW8082A					(SW3550C)			
Aroclor 1016	BRL	0.20		mg/Kg	345647	6	11/03/2022 16:57	ST
Aroclor 1221	BRL	0.20		mg/Kg	345647	6	11/03/2022 16:57	ST
Aroclor 1232	BRL	0.20		mg/Kg	345647	6	11/03/2022 16:57	ST
Aroclor 1242	BRL	0.20		mg/Kg	345647	6	11/03/2022 16:57	ST
Aroclor 1248	BRL	0.20		mg/Kg	345647	6	11/03/2022 16:57	ST
Aroclor 1254	BRL	0.20		mg/Kg	345647	6	11/03/2022 16:57	ST
Aroclor 1260	BRL	0.20		mg/Kg	345647	6	11/03/2022 16:57	ST
Surr: Decachlorobiphenyl	72.8	47.7-130		%REC	345647	1	11/02/2022 19:22	ST
Surr: Tetrachloro-m-xylene	74.4	50.1-130		%REC	345647	1	11/02/2022 19:22	ST

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value

- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- F Analyzed in the lab which is a deviation from the method
- < Less than Result value
- J Estimated value detected below Reporting Limit

Client: S&ME, Inc.
Project Name: Cape Lookout
Lab ID: 2211023-007

Client Sample ID: P-7
Collection Date: 10/27/2022
Matrix: Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
POLYCHLORINATED BIPHENYLS SW8082A					(SW3550C)			
Aroclor 1016	BRL	0.20		mg/Kg	345647	6	11/03/2022 17:08	ST
Aroclor 1221	BRL	0.20		mg/Kg	345647	6	11/03/2022 17:08	ST
Aroclor 1232	BRL	0.20		mg/Kg	345647	6	11/03/2022 17:08	ST
Aroclor 1242	BRL	0.20		mg/Kg	345647	6	11/03/2022 17:08	ST
Aroclor 1248	BRL	0.20		mg/Kg	345647	6	11/03/2022 17:08	ST
Aroclor 1254	BRL	0.20		mg/Kg	345647	6	11/03/2022 17:08	ST
Aroclor 1260	BRL	0.20		mg/Kg	345647	6	11/03/2022 17:08	ST
Surr: Decachlorobiphenyl	17.4	47.7-130	S	%REC	345647	1	11/02/2022 19:33	ST
Surr: Tetrachloro-m-xylene	22.7	50.1-130	S	%REC	345647	1	11/02/2022 19:33	ST

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value

- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- F Analyzed in the lab which is a deviation from the method
- < Less than Result value
- J Estimated value detected below Reporting Limit

Client: S&ME, Inc.
Project Name: Cape Lookout
Lab ID: 2211023-008

Client Sample ID: P-8
Collection Date: 10/27/2022
Matrix: Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
POLYCHLORINATED BIPHENYLS SW8082A					(SW3550C)			
Aroclor 1016	BRL	0.20		mg/Kg	345647	6	11/03/2022 17:19	ST
Aroclor 1221	BRL	0.20		mg/Kg	345647	6	11/03/2022 17:19	ST
Aroclor 1232	BRL	0.20		mg/Kg	345647	6	11/03/2022 17:19	ST
Aroclor 1242	BRL	0.20		mg/Kg	345647	6	11/03/2022 17:19	ST
Aroclor 1248	BRL	0.20		mg/Kg	345647	6	11/03/2022 17:19	ST
Aroclor 1254	BRL	0.20		mg/Kg	345647	6	11/03/2022 17:19	ST
Aroclor 1260	BRL	0.20		mg/Kg	345647	6	11/03/2022 17:19	ST
Surr: Decachlorobiphenyl	79.6	47.7-130		%REC	345647	1	11/02/2022 19:45	ST
Surr: Tetrachloro-m-xylene	85.4	50.1-130		%REC	345647	1	11/02/2022 19:45	ST

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value

- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- F Analyzed in the lab which is a deviation from the method
- < Less than Result value
- J Estimated value detected below Reporting Limit

Client: S&ME, Inc.
Project Name: Cape Lookout
Lab ID: 2211023-009

Client Sample ID: P-9
Collection Date: 10/27/2022
Matrix: Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
POLYCHLORINATED BIPHENYLS SW8082A					(SW3550C)			
Aroclor 1016	BRL	3.3		mg/Kg	345647	100	11/03/2022 19:12	ST
Aroclor 1221	BRL	3.3		mg/Kg	345647	100	11/03/2022 19:12	ST
Aroclor 1232	BRL	3.3		mg/Kg	345647	100	11/03/2022 19:12	ST
Aroclor 1242	BRL	3.3		mg/Kg	345647	100	11/03/2022 19:12	ST
Aroclor 1248	BRL	3.3		mg/Kg	345647	100	11/03/2022 19:12	ST
Aroclor 1254	BRL	3.3		mg/Kg	345647	100	11/03/2022 19:12	ST
Aroclor 1260	BRL	3.3		mg/Kg	345647	100	11/03/2022 19:12	ST
Surr: Decachlorobiphenyl	793	47.7-130	S	%REC	345647	1	11/02/2022 20:30	ST
Surr: Tetrachloro-m-xylene	56.4	50.1-130		%REC	345647	1	11/02/2022 20:30	ST

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value

- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- F Analyzed in the lab which is a deviation from the method
- < Less than Result value
- J Estimated value detected below Reporting Limit

Client: S&ME, Inc.
Project Name: Cape Lookout
Lab ID: 2211023-010

Client Sample ID: P-10
Collection Date: 10/27/2022
Matrix: Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
POLYCHLORINATED BIPHENYLS SW8082A					(SW3550C)			
Aroclor 1016	BRL	0.67		mg/Kg	345647	20	11/03/2022 17:31	ST
Aroclor 1221	BRL	0.67		mg/Kg	345647	20	11/03/2022 17:31	ST
Aroclor 1232	BRL	0.67		mg/Kg	345647	20	11/03/2022 17:31	ST
Aroclor 1242	BRL	0.67		mg/Kg	345647	20	11/03/2022 17:31	ST
Aroclor 1248	BRL	0.67		mg/Kg	345647	20	11/03/2022 17:31	ST
Aroclor 1254	BRL	0.67		mg/Kg	345647	20	11/03/2022 17:31	ST
Aroclor 1260	BRL	0.67		mg/Kg	345647	20	11/03/2022 17:31	ST
Surr: Decachlorobiphenyl	27.1	47.7-130	S	%REC	345647	1	11/02/2022 20:41	ST
Surr: Tetrachloro-m-xylene	23.9	50.1-130	S	%REC	345647	1	11/02/2022 20:41	ST

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value

- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- F Analyzed in the lab which is a deviation from the method
- < Less than Result value
- J Estimated value detected below Reporting Limit

Client: S&ME, Inc.
Project Name: Cape Lookout
Lab ID: 2211023-011

Client Sample ID: P-11
Collection Date: 10/27/2022
Matrix: Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
POLYCHLORINATED BIPHENYLS SW8082A					(SW3550C)			
Aroclor 1016	BRL	0.033		mg/Kg	345647	1	11/03/2022 17:42	ST
Aroclor 1221	BRL	0.033		mg/Kg	345647	1	11/03/2022 17:42	ST
Aroclor 1232	BRL	0.033		mg/Kg	345647	1	11/03/2022 17:42	ST
Aroclor 1242	BRL	0.033		mg/Kg	345647	1	11/03/2022 17:42	ST
Aroclor 1248	BRL	0.033		mg/Kg	345647	1	11/03/2022 17:42	ST
Aroclor 1254	BRL	0.033		mg/Kg	345647	1	11/03/2022 17:42	ST
Aroclor 1260	BRL	0.033		mg/Kg	345647	1	11/03/2022 17:42	ST
Surr: Decachlorobiphenyl	88.1	47.7-130		%REC	345647	1	11/03/2022 17:42	ST
Surr: Tetrachloro-m-xylene	74.5	50.1-130		%REC	345647	1	11/03/2022 17:42	ST

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value

- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- F Analyzed in the lab which is a deviation from the method
- < Less than Result value
- J Estimated value detected below Reporting Limit

Client: S&ME, Inc.
Project Name: Cape Lookout
Lab ID: 2211023-012

Client Sample ID: P-12
Collection Date: 10/27/2022
Matrix: Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
POLYCHLORINATED BIPHENYLS SW8082A					(SW3550C)			
Aroclor 1016	BRL	0.033		mg/Kg	345647	1	11/03/2022 17:53	ST
Aroclor 1221	BRL	0.033		mg/Kg	345647	1	11/03/2022 17:53	ST
Aroclor 1232	BRL	0.033		mg/Kg	345647	1	11/03/2022 17:53	ST
Aroclor 1242	BRL	0.033		mg/Kg	345647	1	11/03/2022 17:53	ST
Aroclor 1248	BRL	0.033		mg/Kg	345647	1	11/03/2022 17:53	ST
Aroclor 1254	BRL	0.033		mg/Kg	345647	1	11/03/2022 17:53	ST
Aroclor 1260	BRL	0.033		mg/Kg	345647	1	11/03/2022 17:53	ST
Surr: Decachlorobiphenyl	80.6	47.7-130		%REC	345647	1	11/03/2022 17:53	ST
Surr: Tetrachloro-m-xylene	78.9	50.1-130		%REC	345647	1	11/03/2022 17:53	ST

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value

- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- F Analyzed in the lab which is a deviation from the method
- < Less than Result value
- J Estimated value detected below Reporting Limit

Client: S&ME, Inc.
Project Name: Cape Lookout
Lab ID: 2211023-013

Client Sample ID: P-13
Collection Date: 10/27/2022
Matrix: Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
POLYCHLORINATED BIPHENYLS SW8082A					(SW3550C)			
Aroclor 1016	BRL	0.33		mg/Kg	345647	10	11/03/2022 18:05	ST
Aroclor 1221	BRL	0.33		mg/Kg	345647	10	11/03/2022 18:05	ST
Aroclor 1232	BRL	0.33		mg/Kg	345647	10	11/03/2022 18:05	ST
Aroclor 1242	BRL	0.33		mg/Kg	345647	10	11/03/2022 18:05	ST
Aroclor 1248	BRL	0.33		mg/Kg	345647	10	11/03/2022 18:05	ST
Aroclor 1254	0.15	0.033		mg/Kg	345647	1	11/02/2022 21:15	ST
Aroclor 1260	0.086	0.033		mg/Kg	345647	1	11/02/2022 21:15	ST
Surr: Decachlorobiphenyl	40.9	47.7-130	S	%REC	345647	1	11/02/2022 21:15	ST
Surr: Tetrachloro-m-xylene	38.5	50.1-130	S	%REC	345647	1	11/02/2022 21:15	ST

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value

- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- F Analyzed in the lab which is a deviation from the method
- < Less than Result value
- J Estimated value detected below Reporting Limit

Client: S&ME, Inc.
Project Name: Cape Lookout
Lab ID: 2211023-014

Client Sample ID: P-14
Collection Date: 10/27/2022
Matrix: Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
POLYCHLORINATED BIPHENYLS SW8082A					(SW3550C)			
Aroclor 1016	BRL	0.33		mg/Kg	345647	10	11/03/2022 18:16	ST
Aroclor 1221	BRL	0.33		mg/Kg	345647	10	11/03/2022 18:16	ST
Aroclor 1232	BRL	0.33		mg/Kg	345647	10	11/03/2022 18:16	ST
Aroclor 1242	BRL	0.33		mg/Kg	345647	10	11/03/2022 18:16	ST
Aroclor 1248	BRL	0.33		mg/Kg	345647	10	11/03/2022 18:16	ST
Aroclor 1254	1.4	0.33		mg/Kg	345647	10	11/03/2022 18:16	ST
Aroclor 1260	0.91	0.33		mg/Kg	345647	10	11/03/2022 18:16	ST
Surr: Decachlorobiphenyl	42.8	47.7-130	S	%REC	345647	1	11/02/2022 21:26	ST
Surr: Tetrachloro-m-xylene	23.5	50.1-130	S	%REC	345647	1	11/02/2022 21:26	ST

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value

- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- F Analyzed in the lab which is a deviation from the method
- < Less than Result value
- J Estimated value detected below Reporting Limit

Client: S&ME, Inc.
Project Name: Cape Lookout
Lab ID: 2211023-015

Client Sample ID: P-15
Collection Date: 10/27/2022
Matrix: Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
POLYCHLORINATED BIPHENYLS SW8082A					(SW3550C)			
Aroclor 1016	BRL	0.17		mg/Kg	345647	5	11/03/2022 18:27	ST
Aroclor 1221	BRL	0.17		mg/Kg	345647	5	11/03/2022 18:27	ST
Aroclor 1232	BRL	0.17		mg/Kg	345647	5	11/03/2022 18:27	ST
Aroclor 1242	BRL	0.17		mg/Kg	345647	5	11/03/2022 18:27	ST
Aroclor 1248	BRL	0.17		mg/Kg	345647	5	11/03/2022 18:27	ST
Aroclor 1254	0.061	0.033		mg/Kg	345647	1	11/02/2022 21:38	ST
Aroclor 1260	0.072	0.033		mg/Kg	345647	1	11/02/2022 21:38	ST
Surr: Decachlorobiphenyl	14.7	47.7-130	S	%REC	345647	1	11/02/2022 21:38	ST
Surr: Tetrachloro-m-xylene	5.01	50.1-130	S	%REC	345647	1	11/02/2022 21:38	ST

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value

- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- F Analyzed in the lab which is a deviation from the method
- < Less than Result value
- J Estimated value detected below Reporting Limit

Client: S&ME, Inc.
Project Name: Cape Lookout
Lab ID: 2211023-016

Client Sample ID: P-16
Collection Date: 10/28/2022
Matrix: Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
POLYCHLORINATED BIPHENYLS SW8082A					(SW3550C)			
Aroclor 1016	BRL	0.33		mg/Kg	345647	10	11/04/2022 16:56	ST
Aroclor 1221	BRL	0.33		mg/Kg	345647	10	11/04/2022 16:56	ST
Aroclor 1232	BRL	0.33		mg/Kg	345647	10	11/04/2022 16:56	ST
Aroclor 1242	BRL	0.33		mg/Kg	345647	10	11/04/2022 16:56	ST
Aroclor 1248	BRL	0.33		mg/Kg	345647	10	11/04/2022 16:56	ST
Aroclor 1254	BRL	0.33		mg/Kg	345647	10	11/04/2022 16:56	ST
Aroclor 1260	BRL	0.33		mg/Kg	345647	10	11/04/2022 16:56	ST
Surr: Decachlorobiphenyl	95.3	47.7-130		%REC	345647	1	11/03/2022 18:38	ST
Surr: Tetrachloro-m-xylene	63.9	50.1-130		%REC	345647	1	11/03/2022 18:38	ST

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value

- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- F Analyzed in the lab which is a deviation from the method
- < Less than Result value
- J Estimated value detected below Reporting Limit

Client: S&ME, Inc.
Project Name: Cape Lookout
Lab ID: 2211023-017

Client Sample ID: P-17
Collection Date: 10/28/2022
Matrix: Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
POLYCHLORINATED BIPHENYLS SW8082A					(SW3550C)			
Aroclor 1016	BRL	0.033		mg/Kg	345647	1	11/03/2022 18:49	ST
Aroclor 1221	BRL	0.033		mg/Kg	345647	1	11/03/2022 18:49	ST
Aroclor 1232	BRL	0.033		mg/Kg	345647	1	11/03/2022 18:49	ST
Aroclor 1242	BRL	0.033		mg/Kg	345647	1	11/03/2022 18:49	ST
Aroclor 1248	BRL	0.033		mg/Kg	345647	1	11/03/2022 18:49	ST
Aroclor 1254	BRL	0.33		mg/Kg	345647	10	11/04/2022 17:07	ST
Aroclor 1260	BRL	0.33		mg/Kg	345647	10	11/04/2022 17:07	ST
Surr: Decachlorobiphenyl	80.1	47.7-130		%REC	345647	1	11/03/2022 18:49	ST
Surr: Tetrachloro-m-xylene	78.3	50.1-130		%REC	345647	1	11/03/2022 18:49	ST

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value

- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- F Analyzed in the lab which is a deviation from the method
- < Less than Result value
- J Estimated value detected below Reporting Limit

Client: S&ME, Inc.
Project Name: Cape Lookout
Lab ID: 2211023-018

Client Sample ID: P-18
Collection Date: 10/28/2022
Matrix: Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
POLYCHLORINATED BIPHENYLS SW8082A					(SW3550C)			
Aroclor 1016	BRL	0.033		mg/Kg	345647	1	11/03/2022 19:35	ST
Aroclor 1221	BRL	0.033		mg/Kg	345647	1	11/03/2022 19:35	ST
Aroclor 1232	BRL	0.033		mg/Kg	345647	1	11/03/2022 19:35	ST
Aroclor 1242	BRL	0.033		mg/Kg	345647	1	11/03/2022 19:35	ST
Aroclor 1248	BRL	0.033		mg/Kg	345647	1	11/03/2022 19:35	ST
Aroclor 1254	BRL	0.033		mg/Kg	345647	1	11/03/2022 19:35	ST
Aroclor 1260	BRL	0.033		mg/Kg	345647	1	11/03/2022 19:35	ST
Surr: Decachlorobiphenyl	5.97	47.7-130	S	%REC	345647	1	11/03/2022 19:35	ST
Surr: Tetrachloro-m-xylene	6.84	50.1-130	S	%REC	345647	1	11/03/2022 19:35	ST

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Below reporting limit
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- > Greater than Result value

- E Estimated (value above quantitation range)
- S Spike Recovery outside limits due to matrix
- Narr See case narrative
- F Analyzed in the lab which is a deviation from the method
- < Less than Result value
- J Estimated value detected below Reporting Limit

SAMPLE/COOLER RECEIPT CHECKLIST

Clear

Save as

1. Client Name: **Access Analytical, Inc**

AES Work Order Number: **2211023**

2. Carrier: FedEx ☒ UPS ☐ USPS ☐ Client ☐ Courier ☐ Other ☐

	Yes	No	N/A	Details	Comments
3. Shipping container/cooler received in good condition?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	damaged <input type="checkbox"/> leaking <input type="checkbox"/> other <input type="checkbox"/>	
4. Custody seals present on shipping container?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		
5. Custody seals intact on shipping container?	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>		
6. Temperature blanks present?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		
7. Cooler temperature(s) within limits of 0-6°C? [See item 13 and 14 for temperature recordings.]	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Cooling initiated for recently collected samples / ice present <input type="checkbox"/>	
8. Chain of Custody (COC) present?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		
9. Chain of Custody signed, dated, and timed when relinquished and received?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		
10. Sampler name and/or signature on COC?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		
11. Were all samples received within holding time?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		
12. TAT marked on the COC?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	If no TAT indicated, proceeded with standard TAT per Terms & Conditions. <input type="checkbox"/>	

13. Cooler 1 Temperature 4.0 °C Cooler 2 Temperature _____ °C Cooler 3 Temperature _____ °C Cooler 4 Temperature _____ °C
 14. Cooler 5 Temperature _____ °C Cooler 6 Temperature _____ °C Cooler 7 Temperature _____ °C Cooler 8 Temperature _____ °C

15. Comments: _____

I certify that I have completed sections 1-15 (dated initials).

DG 11/1/22

	Yes	No	N/A	Details	Comments
16. Were sample containers intact upon receipt?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		
17. Custody seals present on sample containers?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		
18. Custody seals intact on sample containers?	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>		
19. Do sample container labels match the COC?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	incomplete info <input type="checkbox"/> illegible <input type="checkbox"/> no label <input type="checkbox"/> other <input type="checkbox"/>	
20. Are analyses requested indicated on the COC?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		
21. Were all of the samples listed on the COC received?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	samples received but not listed on COC <input type="checkbox"/> samples listed on COC not received <input type="checkbox"/>	
22. Was the sample collection date/time noted?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		
23. Did we receive sufficient sample volume for indicated analyses?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		
24. Were samples received in appropriate containers?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		
25. Were VOA samples received without headspace (< 1/4" bubble)?	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>		
26. Were trip blanks submitted?	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	listed on COC <input type="checkbox"/> not listed on COC <input type="checkbox"/>	

27. Comments: _____

This section only applies to samples where pH can be checked at Sample Receipt.

I certify that I have completed sections 16-27 (dated initials).

DG 11/1/22

	Yes	No	N/A	Details	Comments
28. Have containers needing chemical preservation been checked? *	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>		
29. Containers meet preservation guidelines?	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>		
30. Was pH adjusted at Sample Receipt?	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>		

* Note: Certain analyses require chemical preservation but must be checked in the laboratory and not upon Sample Receipt such as Coliforms, VOCs and Oil & Grease/TPH.

This also excludes metals by EPA 200.7, 200.8 and 245.1 which will be verified between 16 and 24 hours after preservation.

I certify that I have completed sections 28-30 (dated initials).

DG 11/1/22

Locked

Client: S&ME, Inc.
 Project Name: Cape Lookout
 Workorder: 2211023

ANALYTICAL QC SUMMARY REPORT

BatchID: 345647

Sample ID: MB-345647	Client ID:					Units: mg/Kg	Prep Date: 11/02/2022	Run No: 500475			
SampleType: MBLK	TestCode: POLYCHLORINATED BIPHENYLS	SW8082A	BatchID: 345647				Analysis Date: 11/02/2022	Seq No: 11717878			
Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual

Aroclor 1016	BRL	0.033									
Aroclor 1221	BRL	0.033									
Aroclor 1232	BRL	0.033									
Aroclor 1242	BRL	0.033									
Aroclor 1248	BRL	0.033									
Aroclor 1254	BRL	0.033									
Aroclor 1260	BRL	0.033									
Surr: Decachlorobiphenyl	0.02060	0	0.0167		124	47.7	130				
Surr: Tetrachloro-m-xylene	0.01503	0	0.0167		90.2	50.1	130				

Sample ID: LCS-345647	Client ID:					Units: mg/Kg	Prep Date: 11/02/2022	Run No: 500475			
SampleType: LCS	TestCode: POLYCHLORINATED BIPHENYLS	SW8082A	BatchID: 345647				Analysis Date: 11/02/2022	Seq No: 11717879			
Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual

Aroclor 1016	0.1668	0.033	0.1667		100	61.3	128				
Aroclor 1260	0.1705	0.033	0.1667		102	60.8	129				
Surr: Decachlorobiphenyl	0.02058	0	0.0167		123	47.7	130				
Surr: Tetrachloro-m-xylene	0.01633	0	0.0167		98.0	50.1	130				

Sample ID: LCSD-345647	Client ID:					Units: mg/Kg	Prep Date: 11/02/2022	Run No: 500475			
SampleType: LCSD	TestCode: POLYCHLORINATED BIPHENYLS	SW8082A	BatchID: 345647				Analysis Date: 11/02/2022	Seq No: 11717880			
Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual

Aroclor 1016	0.1709	0.033	0.1667		103	61.3	128	0.1668	2.37	24	
Aroclor 1260	0.1732	0.033	0.1667		104	60.8	129	0.1705	1.59	31	
Surr: Decachlorobiphenyl	0.02228	0	0.0167		134	47.7	130	0.02058	0	0	S
Surr: Tetrachloro-m-xylene	0.01689	0	0.0167		101	50.1	130	0.01633	0	0	

Qualifiers:	>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
	BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
	J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
	Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

End of Report