



TECHNICAL SPECIFICATIONS BOOK FOR

CASA FOREMAN

CAMINO FOREMAN, CARR 123, KM 29.9,
BARRIO PORTUGUÉS, ADJUNTAS
PUERTO RICO

ISSUE FOR BIDDING
NOR FOR CONSTRUCTION

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TECHNICAL SPECIFICATIONS FOR

CASA FOREMAN

CAMINO FOREMAN, CARR 123, KM 29.9,
BARRIO PORTUGUÉS, ADJUNTAS
PUERTO RICO

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SECTION 01 00 00

GENERAL SPECIFICATIONS

1. DEFINITIONS

Wherever the words defined in this section or pronouns used in their stead occur in the Contract Documents, they shall have the meanings herein given.

AS DIRECTED, AS REQUIRED, ETC.

Wherever in the Contract Documents, or on the Drawings, the words "as directed," "as ordered," "as requested," "as required," "as permitted," or words of like import are used, it shall be understood that the direction, order, request, requirement, or permission of the Architect is intended. Similarly, the words "approved," "acceptable," "suitable," "satisfactory," and words of like import shall mean approved by, acceptable to, suitable to, or satisfactory to the Architect.

ELEVATION

The figures given on the Drawings or in the other Contract Documents after the word "elevation" or abbreviation of it shall mean the distance in feet above the datum adopted by the Architect.

ROCK

The word "rock", wherever used as the name of an excavated material or material to be excavated, shall mean only boulders and pieces of concrete or masonry exceeding 1 cu. yd. in volume, or solid ledge rock which, in the opinion of the Architect, requires, for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power-operated tool. No soft or disintegrated rock which can be removed with a hand pick or power-operated excavator or shovel, no loose, shaken, or previously blasted rock or broken stone in rock fillings or elsewhere, and no rock exterior to the maximum limits of measurement allowed, which may fall into the excavation, will be measured or allowed as "rock."

EARTH

The word "earth", wherever used as the name of an excavated material or material to be excavated, shall mean all kinds of material other than rock as above defined.

2. ABBREVIATIONS AND CLARIFICATIONS

Where any of the following abbreviations are used in the Contract Documents, they shall have the meaning set forth opposite each.

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction

ANS	American National Standard
ANSI	American National Standards Institute
ASCE	American Society of Civil Architects
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
Fed. Spec.	Federal Specifications issued by the Federal Supply Service of the General Services Administration, Washington, D. C.
125-lb. ANS appropriate class	American National Standard for Cast-iron 250-1b. ANS Pipe Flanges and Flanged Fittings, Designation B16.1-1975, for the
AWG	American or Brown and Sharpe Wire
Gage NPT	National Pipe Thread
OS&Y	Outside screw and yoke
Stl. WG	U. S. Steel Wire, Washburn and Moen, American Steel and Wire or Roebling Gage
USS Gage	United States Standard Gage
WOG	Water, Oil, Gas
WSP	Working steam pressure

3. HANDLING AND DISTRIBUTION

The Contractor shall handle, haul, and distribute all materials and all surplus materials on the different portions of the Work, as necessary or required; shall provide suitable and adequate storage room for materials and equipment during the progress of the Work, and be responsible for the protection, loss of, or damage to materials and equipment furnished by him, until the final completion and acceptance of the Work.

Storage and demurrage charges by transportation companies and vendors shall be borne by the Contractor.

4. MATERIALS - SAMPLES - INSPECTION

Unless otherwise expressly provided on the Drawings or in any of the other Contract Documents, only new materials and equipment shall be incorporated in the Work. All materials and equipment furnished by the Contractor to be incorporated in the Work shall be subject to the inspection of the Architect. No material shall be processed or fabricated for the Work or delivered to the Work site without prior concurrence of the

Architect.

As soon as possible after execution of the AGREEMENT, the Contractor shall submit to the Architect the names and addresses of the manufacturers and suppliers of all materials and equipment he proposes to incorporate into the Work. When shop and working drawings are required as specified below, the Contractor shall submit prior to the submission of such drawings, data in sufficient detail to enable the Architect to determine whether the manufacturer and/or the supplier have the ability to furnish a product meeting the Specifications. As requested, the Contractor shall also submit data relating to the materials and equipment he proposes to incorporate into the Work in sufficient detail to enable the Architect to identify and evaluate the particular product and to determine whether it conforms to the Contract requirements. Such data shall be submitted in a manner similar to that specified for submission of shop and working drawings.

Facilities and labor for storage, handling, and inspection of all materials and equipment, shall be furnished by the Contractor. Defective materials and equipment shall be removed immediately from the site of the Work.

If the Architect so requires, either prior to or after commencement of the Work, the Contractor shall submit samples of materials for such special tests as the Architect deems necessary to demonstrate that they conform to the Specifications. Such samples, including concrete test cylinders, shall be furnished, taken, stored, packed, and shipped by the Contractor as directed. The Contractor shall furnish suitable molds for making concrete test cylinders. Except as otherwise expressly specified, the Owner representatives shall make arrangements for, and pay for, the tests.

All samples shall be packed so as to reach their destination in good condition, and shall be labeled to indicate the material represented, the name of the building or work and location for which the material is intended, and the name of the Contractor submitting the sample. To ensure consideration of samples, the Contractor shall notify the Architect by letter that the samples have been shipped and shall properly describe the samples in the letter. The letter of notification shall be sent separate from and should not be enclosed with the samples.

The Contractor shall submit data and samples, or place his orders, sufficiently early to permit consideration, inspection and testing before the materials and equipment are needed for incorporation in the Work. The consequences of his failure to do so shall be the Contractor's sole responsibility.

In order to demonstrate the proficiency of workmen, or to facilitate the choice among several textures, types, finishes, surfaces, etc., the Contractor shall provide such samples of workmanship of wall, floor, finish, etc., as may be required.

When required, the Contractor shall furnish to the Architect triplicate sworn copies of manufacturer's shop or mill tests (or reports from independent testing laboratories) relative to materials, equipment performance ratings, and concrete data.

After review of the samples, data, etc., the materials and equipment used on the Work shall in all respects conform therewith.

5. INSPECTION OF WORK AWAY FROM THE SITE

If work to be done away from the construction site is to be inspected on behalf of the Owner representatives during its fabrication, manufacture, or testing, or before shipment, the Contractor shall give notice to the Architect of the place and time where such fabrication, manufacture, testing, or shipping is to be done. Such notice shall be in writing and delivered to the Architect in ample time so that the necessary arrangements for the

inspection can be made.

6. CONTRACTOR'S SHOP AND WORKING DRAWINGS

The Contractor shall submit (in reproducible transparency form unless otherwise specified) shop and working drawings of concrete reinforcement, structural details, piping layout, wiring, materials fabricated especially for the Contract, and materials and equipment for which such drawings are specifically requested.

Such drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawing. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for the Contract.

When so specified or if considered by the Architect to be acceptable manufacturer's specifications, catalog data, descriptive matter, illustrations, etc., may be submitted in place of shop and working drawings. In such case the requirements shall be as specified for shop and working drawings, insofar as applicable, except that the submission shall be in quadruplicate.

The Contractor shall be responsible for the prompt and timely submittal of all shop and working drawings so that there shall be no delay to the Work due to the absence of such drawings. Prior to the submittal of any shop drawings, the Contractor shall submit a schedule of proposed shop drawing transmittals. The schedule shall identify the subject matter of each transmittal the corresponding specification section number and the proposed date of submission. During the progress of the Work the schedule shall be revised and resubmitted as necessary.

No material or equipment shall be purchased or fabricated especially for the Contract until the required shop and working drawings have been submitted as herein above provided and reviewed for conformance to the Contract requirements. All such materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by said drawings.

Until the necessary review has been made, the Contractor shall not proceed with any portion of the Work (such as the construction of foundations), the design or details of which are dependent upon the design or details of work, materials, equipment or other features for which review is required.

All shop and working drawings shall be submitted to the Architect by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from his subcontractors and returning reviewed drawings to them. All shop and working drawings shall be prepared on standard size, 24-in. by 36-in. sheets, except for those made by changing the existing standard shop or working drawings. All drawings shall be clearly marked with the names of the Owner representatives, Contractor, and building, equipment, or structure to which the drawing applies, and shall be suitably numbered. Each shipment of drawings shall be accompanied by a letter of transmittal giving a list of the drawing numbers and the names mentioned above.

Only drawings which have been checked and corrected by the fabricator, should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Architect, the Contractor shall check thoroughly all such drawings to satisfy him-self, that the subject matter thereof conforms to the Drawings and Specifications in all respects. All drawings, which are correct, shall be marked with the date, checker's name, and indication of the Contractor's approval, and then shall be submitted to the Architect; other drawings shall be returned for correction.

If a shop drawing shows any deviation from the Contract requirements, the Contractor shall make specific mention of the deviations in his letter of transmittal.

The review of shop and working drawings hereunder will be general only, and nothing contained in this GENERAL SPECIFICATION shall relieve, diminish or alter in any respect the responsibilities of the Contractor under the Contract Documents and in particular, the specific responsibility of the Contractor for details of design and dimensions necessary for proper fitting and construction of the work as required by the Contract and for achieving the result and performance specified thereunder.

Should the Contractor submit equipment that requires modifications to the structures, piping, electrical conduit, wires and appurtenances, layout, etc., detailed on the Drawings, he shall also submit details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the Owner representatives, shall do all work necessary to make such modifications.

The marked-up reproducible of the shop and working drawings or one marked-up copy of catalog cuts will be returned to the Contractor. The Contractor shall furnish additional copies of such drawings or catalog cuts when so requested.

7. OCCUPYING PRIVATE LAND

The Contractor shall not (except after written consent from the proper parties) enter or occupy with men, tools, materials, or equipment, any land outside the rights-of-way or property of the Owner representatives. A copy of the written consent shall be given to the Architect.

8. INTERFERENCE WITH AND PROTECTION OF STREETS

The Contractor shall not close or obstruct any portion of a street, road, or private way without obtaining permits therefor from the proper authorities. If any street, road or private way shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the proper authorities.

Streets, roads, private ways, and sidewalks, not closed, shall be maintained passable and safe by the Contractor, who shall assume and have full responsibility for the adequacy and safety of provisions made therefor.

The Contractor shall, at least 24 hours in advance, notify the Police and Fire Departments in writing, with a copy to the Architect, if the closure of a street or road is necessary. He shall cooperate with the Police Department in the establishment of alternate routes and shall provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion.

9. STORAGE OF MATERIALS AND EQUIPMENT

All excavated materials and equipment to be incorporated in the Work shall be placed so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the Work. Materials and equipment shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining owner representatives, tenants and occupants.

10. SAFETY

The Contractor shall take all necessary precautions and provide all necessary safeguards to prevent personal injury and property damage. The Contractor shall provide protection for all persons including but not limited to his employees and employees of other contractors or subcontractors; members of the public; and employees, agents, and representatives of the Owner representatives, the Architect, and regulatory agencies that may be on or about the Work. The Contractor shall provide protection for all public and private property including but not limited to structures, pipes, and utilities, above and below ground.

The Contractor shall provide and maintain all necessary safety equipment such as fences, barriers, signs, lights, walkways, guards and fire prevention and fire-fighting equipment and shall take such other action as is required to fulfill his obligations under this subsection.

The Contractor shall comply with all applicable Federal, State and local laws, ordinances, rules and regulations and lawful orders of all authorities having jurisdiction for the safety of persons and protection of property.

The Contractor shall designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This responsible person shall have the authority to take immediate action to correct unsafe or hazardous conditions and to enforce safety precautions and programs.

11. SANITARY REGULATIONS

The Contractor shall provide adequate sanitary facilities for the use of those employed on the Work. Such facilities shall be made available when the first employees arrive on the site of the Work, shall be properly secluded from public observation, and shall be constructed and maintained during the progress of the Work in suitable numbers and at such points and in such manner as may be required.

The Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. He shall rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the Owner representatives, or on adjacent property.

12. LINES, GRADES AND MEASUREMENTS

The Contractor shall employ a competent civil Architect, registered within Puerto Rico as a Professional Architect or Land Surveyor. The Contractor shall require said Architect to establish all lines, elevations, reference marks, batter boards, etc., needed by the Contractor during the progress of the Work, and from time to time to verify such marks by instrument or other appropriate means.

The Architect shall be permitted at all times to check the lines, elevations, reference marks, batter boards, etc., set by the Contractor, who shall correct any errors in lines, elevations, reference marks, batter boards, etc., disclosed by such check. Such a check shall not be construed to be an approval of the Contractor's work and shall not relieve or diminish in any way the responsibility of the Contractor for the accurate and satisfactory construction and completion of the entire Work.

The Contractor shall make, check, and be responsible for all measurements and dimensions necessary for the proper construction of and the prevention of misfittings in the Work.

13. DIMENSIONS OF EXISTING STRUCTURES

Where the dimensions and locations of existing structures are of importance in the installation or connection of any part of the Work, the Contractor shall verify such dimensions and locations in the field before the fabrication of any material or equipment which is dependent on the correctness of such

information.

14. WORK TO CONFORM

During its progress and on its completion, the Work shall conform truly to the lines, levels, and grades indicated on the Drawings or given by the Architect and shall be built in a thoroughly substantial and skillfully and competent manner, in strict accordance with the Drawings, Specifications, and other Contract Documents and the directions given from time to time by the Architect.

All work done without instructions having been given therefor by the Architect, without proper lines or levels, or performed during the absence of the Architect, will not be estimated or paid for except when such work is authorized by the Architect in writing. Work so done may be ordered uncovered or taken down, removed, and replaced at the Contractor's expense.

15. PIPE LOCATION

Exterior pipelines will be located substantially as indicated on the Drawings, but the right is reserved to the Owner representatives, acting through the Architect, to make such modifications in location as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings, etc., are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items where required.

Small interior piping is indicated diagrammatically on the Drawings, and the exact location is to be determined in the field. Piping shall be arranged in a neat, compact, and skillfully and competent manner, with a minimum of crossing and interlacing, so as not to interfere with equipment or access ways, and, in general, without diagonal runs.

16. PLANNING AND PROGRESS SCHEDULES

Before starting the Work and from time to time during its progress, as the Architect may request, the Contractor shall submit to the Architect a written description of the methods he plans to use in doing the Work and the various steps he intends to take.

Within 15 days after the date of formal execution of the AGREEMENT, the Contractor shall prepare and submit to the Architect (a) a written schedule fixing the dates on which additional drawings, if any, will be needed by the Contractor and (b) a written schedule fixing the respective dates for the start and completion of various parts of the Work. Each such schedule shall be subject to review from time to time during the progress of the Work.

17. PRECAUTIONS DURING ADVERSE WEATHER

During adverse weather and against the possibility thereof, the Contractor shall take all necessary precautions so that the Work may be properly done and satisfactory in all respects. When required, protection shall be provided by use of tarpaulins, wood and building-paper shelters, or other suitable means.

During cold weather, materials shall be preheated if required, and the materials and adjacent structure into which they are to be incorporated shall be made and kept sufficiently warm so that a proper bond will take place and a proper curing, aging, or drying will result. Protected spaces shall be artificially heated by suitable means, which will result in a moist or a dry atmosphere according to the particular requirements of the work being protected. Ingredients for concrete and mortar shall be sufficiently heated so that the mixture will be warm throughout when used.

20. ELECTRICAL ENERGY

The Contractor shall make all necessary applications and arrangements and pay all fees and charges for electrical energy for power and light necessary for the proper completion of the Work and during its entire progress. The Contractor shall provide and pay for all temporary wiring, switches, connections, and meters.

The Contractor shall provide sufficient electric lighting so that all work may be done in a skillfully and competent manner when there is not sufficient daylight.

24. CUTTING AND PATCHING

The Contractor shall not cut or alter the work of any subcontractor or any other contractor, nor permit any of his subcontractors to cut or alter the work of any other contractor or subcontractor, except with the written consent of the contractor or subcontractor whose work is to be cut or altered with the written consent of the Architect. All cutting and patching or repairing made necessary by the negligence, carelessness, or incompetence of the Contractor or any of his subcontractors shall be done by or at the expense of the Contractor and shall be the responsibility of the Contractor.

* * *

DIVISION 1 – GENERAL REQUIREMENTS

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Coordination Drawings.
 - 3. Administrative and supervisory personnel.
 - 4. Project meetings.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section "Construction Progress Documentation" for preparing and submitting the Contractor's Construction Schedule.
 - 2. Division 1 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Division 1 Section "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

- A. Coordination: Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. If necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities 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, the following:
1. Preparation of Contractor's Construction Schedule.
 2. Preparation of the Schedule of Values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.

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. Indicate relationship of components shown on separate Shop Drawings.
 2. Indicate required installation sequences.
 3. Refer to Division 23 "Heating, Ventilating and Air-Condition" and Division 26 Section 26 00 00 "Basic Electrical Materials and Methods" for specific Coordination Drawing requirements for mechanical and electrical installations.
- B. Staff Names: Within 15 days of starting construction operations, submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone.

1.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.
 1. Include special personnel required for coordination of operations with other contractors.

1.6 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within 3 days of the meeting.
- B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
 1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing.
 - d. Sustainable products, processes, and documentation.
 - e. Designation of responsible personnel.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for processing Applications for Payment.

- h. Distribution of the Contract Documents.
- i. Submittal procedures.
- j. Preparation of Record Documents.
- k. Use of the premises.
- l. Responsibility for temporary facilities and controls.
- m. Parking availability.
- n. Office, work, and storage areas.
- o. Equipment deliveries and priorities.
- p. First aid.
- q. Security.
- r. Progress cleaning.
- s. Working hours.

C. Preinstallation Conferences: Conduct a preinstallation conference 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 the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

- a. Contract Documents.
- b. Options.
- c. Related Change Orders.
- d. Purchases.
- e. Deliveries.
- f. Submittals.
- g. Review of mockups.
- h. Possible conflicts.
- i. Compatibility problems.
- j. Time schedules.
- k. Weather limitations.
- l. Manufacturer's written recommendations.
- m. Warranty requirements.
- n. Compatibility of materials.
- o. Acceptability of substrates.
- p. Temporary facilities and controls.
- q. Space and access limitations.
- r. Regulations of authorities having jurisdiction.
- s. Testing and inspecting requirements.
- t. Required performance results.
- u. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements.
 4. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at regular intervals. Coordinate dates of meetings with preparation of payment requests.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference 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. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Status of recycling and waste disposal.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site utilization.
 - 9) Temporary facilities and controls.
 - 10) Work hours.
 - 11) Hazards and risks.
 - 12) Progress cleaning.
 - 13) Quality and work standards.
 - 14) Change Orders.
 - 15) Documentation of information for payment requests.

3. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
 - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

DIVISION 1 – GENERAL REQUIREMENTS

SECTION 01 33 00 – SUBMITTALS PROCEDURES

PART 1 GENERAL

1.1 SUBMITTAL FORM AND LOG

- A. The Contractor shall use the submittal form and log at the end of this section or use alternates acceptable to the Owner.
- B. Architect will return submittals without processing if they do not contain Contractor's stamp, if they are not initialed or signed by authorized person, if they are not dated, or if it becomes evident that they have not been properly reviewed. Delays resulting there from are the responsibility of the Contractor.
- C. Contractor shall maintain in field office a copy of submittal schedule and log of submittals indicating current status of each item.
- D. Contractor shall allot time in construction scheduling for liaison with Architect for review of submittals. Except for special submittals, such as those with design calculations and/or detailed shop drawings, submittals will be reviewed in an average time of ten (10) working days.

1.2 REQUEST FOR INFORMATION (RFI) FORM AND LOG

- A. The Contractor shall use the RFI form at the end of this section or use an alternate form acceptable to the Owner.
- B. Contractor shall carefully study and compare Contract Documents before proceeding with fabrication and installation of Work. Promptly advise Architect of any error, inconsistency, omission, or apparent discrepancy discovered.
- C. Contractor shall allot time in construction scheduling for liaison with Architect for handling queries and clarifications.
- D. If Architect is able to respond to a request for information by making specific reference to Drawing sheet or Specification Section, the Owner retains the right to require the Contractor to reimburse Owner for charges of Architect and Architect's Consultants for performing review services for the Contractor.
- E. Contractor shall maintain in field office a copy of the log of RFIs indicating current status of each item.

1.3 SHOP DRAWINGS

- A. Contractor shall bind in complete sets. Transmit reproducible transparencies in roll form to eliminate folding. Folding of prints is acceptable.

- B. Contractor shall allot time in construction scheduling for liaison with Architect for review of shop drawings. Except for special submittals, such as those with design calculations and/or detailed shop drawings, submittals will be reviewed in an average time of ten (10) working days.
- C. Contractor shall present in clear and thorough manner. Title each drawing with Project name and number; identify each element of drawings by reference to sheet number and detail, schedule, or room number of Contract Documents.
- D. Contractor shall show detail, materials, dimensions, thickness, methods of assembly, attachments, relation to adjoining work, and other pertinent data and information.
- E. Contractor shall verify dimensions and field conditions. Clearly indicate field dimensions and field conditions.
- F. Contractor shall not use Contract Drawings for shop drawings. Provide original shop drawings with changes from Contract Drawings clearly indicated.
- G. Identification: Place a permanent label or title block on each submittal for identification.
 - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 - 2. Provide a space approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 - 3. Include the following information on label for processing and recording action taken:
 - A. Project name
 - B. Date
 - C. Name and address of Contractor
 - D. Name and address of supplier
 - E. Name of manufacturer
 - F. Unique identifier, including revision number
 - G. Drawing number and detail references, as appropriate
- H. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.
- I. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.

1.4 PARTIAL SUBMITTALS

Architect will not review partial or incomplete submittals. Complete submittals for each item are required. Submittals will not be considered official until it is complete in every respect. Delays resulting from partial submittals are the responsibility of the Contractor.

1.5 RESUBMITTALS

- A. Make resubmittals under procedures specified for initial submittals; identify changes made since previous submittal.
- B. Architect will record time required to review resubmittals after original submittal and first resubmittal. Owner retains the right to require the Contractor to reimburse Owner for charges to Architect and Architect's Consultants for reviewing submittal more than 2 times.

1.6 DISTRIBUTION

- A. Duplicate and distribute reproductions of shop drawings, product data, samples, and other submittals which bear Architect's stamp of approval to the Project record documents file, the Project site file, subcontractors, suppliers, other affected contractors, and other entities requiring information.
- B. Provide each testing and inspection agency one set of approved submittals for their exclusive use in providing specified quality control testing and inspection services; refer to Section 01 40 00.
- C. The Owner is to receive two copies of all approved submittals, shop drawings and product data.

SUBMITTAL FORM (Submit separate form for each product)

Contractor: _____

Project: _____

TRANSMITTAL To: Contractor _____ Date: _____ Submittal No: _____**L****A** From: Subcontractor _____ By: _____ Resubmission ☐

Quantity	Reference Number	Title/Description/Manufacturer	Specification Section Title, Paragraph / Drawing Detail Reference

- ☐ Submitted for Review and Approval
☐ Resubmitted for Review and Approval
☐ Complies with Contract Requirements
☐ Will be available to meet construction schedule
☐ A/E Review Time included in construction schedule

Other remarks on above submission: _____

- ☐ Substitution Involved - Substitution Request Attached

☐ If Substitution involved, Submission includes full point by point comparative data or Preliminary details

- ☐ Items included in Submission will be ordered immediately upon receipt of approval

TRANSMITTAL To: A/E - Attention _____ Date Received by Contractor: _____**B**

From: Contractor _____ Date Transmitted by Contractor: _____

Reviewed, Coordinated, and Approved by Contractor

Remarks on above submission: _____

One copy retained by sender

TRANSMITTAL To: Contractor _____ Date Received: _____**C**From: A/E ☐ Other Signed _____ Dated Returned: _____

- ☐ Approved
☐ Approved as noted
☐ Disapproved / Resubmit
☐ Not subject to review
☐ Submission Incomplete; Resubmit
☐ Received; No Action Required
☐ Full point by point comparative data

required to complete approval process

- ☐ Provide File Copy with corrections identified
☐ Reproducible copies only returned

Remarks on above submission: One copy retained

TRANSMITTAL To: Subcontractor _____ Date Received: _____**D**

From: Contractor Signed _____ Dated Returned: _____

Copies ☐ University ☐ ☐ ☐ ☐ One copy retained by sender

Remarks on above: _____

Include GC Section 24 required stamp here

END OF SECTION

SECTION 01 50 00 TEMPORARY FACILITIES

1. GENERAL

The Contractor shall provide all temporary facilities necessary for the proper completion of the work, as necessary and as specified.

The Contractor's attention is directed to the requirements of the GENERAL SPECIFICATIONS specified under "Sanitary Regulations", "Precautions During Adverse Weather", and "Electrical Energy".

2. WATER SUPPLY

The Contractor shall make arrangements and pay for all water necessary for completion of construction operations under this contract.

3. PROJECT SIGN

The Contractor shall construct a sign having an area of approximately 96 sq. ft. identifying the project, officials representing the Owner representatives, the Architects, etc. The sign shall be erected in a location selected by the Architect. The Contractor shall maintain the sign throughout the duration of the project. The sign shall be worded as directed by the Architect. See sign details on drawing sheets inside the drawings.

4. CONTRACTOR'S FIELD OFFICE

The Contractor shall maintain a temporary field office near the work for his own use during the period of construction at which readily accessible copies of all contract documents shall be kept. The office shall be located where it will not interfere with the progress of the work. In charge of this office there shall be a competent superintendent of the Contractor as specified under "Supervision of Work" in the AGREEMENT.

5. OFFICE FOR ARCHITECT

Promptly after starting work at the site, the Contractor shall provide and equip a suitable area in the Contractor's trailer (at least 100 sq. ft. of floor area) for the exclusive use of the Architect, and the Contractor shall maintain this office thereafter until the completion of the work to be done under this contract. The office for the Architect shall be a separate room which can be locked. A key to the trailer and the office for the Architect shall be furnished to the Architect.

The office, furniture, equipment, supplies and services necessary shall be satisfactory to the Architect. The Contractor shall furnish the following furniture, equipment, supplies, and services:

- a. One plan table or sloping plan shelf, about 3 ft. by 5 ft., with reasonable smooth top, and one suitable swivel stool.
- b. Two additional chairs.
- c. Four-drawer, legal size, vertical metal filing cabinet with lock

- d. Desk for general office use, about 2.5 ft. by 5 ft., with desk chair of the armchair swivel type.
- e. Telephone extension on desk.
- f. Calculating machine, electric or electronic.
- g. Air conditioning unit of adequate capacity to maintain a minimum temperature differential of 20 deg. F from ambient under the most serious conditions.
- h. Sanitary facility separate from, but in the immediate vicinity of the Architects office.
- i. Drinking water either through a refrigerated fountain connected to potable water supply or ice water furnished daily for the Architect office.

SECTION 01 71 00

CLEANING UP

1. GENERAL

During its progress the work and the adjacent areas affected thereby shall be kept cleaned up and all rubbish, surplus materials, and unneeded construction equipment shall be removed and all damage repaired so that the public and property owner representatives will be inconvenienced as little as possible.

Where material or debris has washed or flowed into or been placed in existing watercourses, ditches, gutters, drains, pipes structures, work done under this contract, or elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the work, and the ditches, channels, drains, pipes, structures, and work, etc., shall, upon completion of the work, be left in a clean and neat condition.

On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove, acceptably disinfect, and cover all organic matter and material containing organic matter in, under, and around privies, houses, and other buildings used by him; shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.

The Contractor shall thoroughly clean all materials and equipment installed by him and his subcontractors, and on completion of the work shall deliver it undamaged and in fresh and new-appearing condition. All mechanical equipment shall be left fully charged with lubricant and ready for operation.

The Contractor shall restore or replace, when and as directed, any public or private property damaged by his work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk, and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable as work progresses and shall not be left until the end of the contract period.

* * *

DIVISION 1 – GENERAL REQUIREMENTS

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Project Record Documents.
 - 3. Operation and maintenance manuals.
 - 4. Warranties.
 - 5. Instruction of Owner's personnel.
 - 6. Final cleaning.
- B. Related Sections include the following:
 - 1. Division 1 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
 - 2. Division 1 Section "Construction Photographs" for submitting Final Completion construction photographs and negatives.
 - 3. Division 1 Section "Execution Requirements" for progress cleaning of Project site.
 - 4. Divisions 2 through 16 Sections for specific closeout and special cleaning requirements for products of those Sections.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.

3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 8. Complete startup testing of systems.
 9. Submit test/adjust/balance records.
 10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 11. Advise Owner of changeover in heat and other utilities.
 12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 13. Complete final cleaning requirements, including touchup painting.
 14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
 2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by

Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

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

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.

1.6 PROJECT RECORD DOCUMENTS

A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

B. Record Drawings: Maintain and submit one set of blue- or black-line white prints of Contract Drawings and Shop Drawings.

1. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - d. Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings.
 2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
 3. Mark important additional information that was either shown schematically or omitted from original Drawings.
 4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.
 5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.
- C. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications. Mark copy to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Note related Change Orders, Record Drawings, and Product Data, where applicable.
- D. Record Product Data: Submit one copy of each Product Data submittal. Mark one set to indicate the actual product installation where installation varies substantially from that indicated in Product Data.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, Record Drawings, and Record Specifications, where applicable.
- E. Miscellaneous Record Submittals: Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

1.7 OPERATION AND MAINTENANCE MANUALS

- A. Assemble a complete set of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in individual Specification Sections and as follows:
1. Operation Data:
 - a. Emergency instructions and procedures.
 - b. System, subsystem, and equipment descriptions, including operating standards.
 - c. Operating procedures, including startup, shutdown, seasonal, and weekend operations.
 - d. Description of controls and sequence of operations.
 - e. Piping diagrams.
 2. Maintenance Data:
 - a. Manufacturer's information, including list of spare parts.
 - b. Name, address, and telephone number of Installer or supplier.
 - c. Maintenance procedures.
 - d. Maintenance and service schedules for preventive and routine maintenance.
 - e. Maintenance record forms.
 - f. Sources of spare parts and maintenance materials.
 - g. Copies of maintenance service agreements.
 - h. Copies of warranties and bonds.
- B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents.

1.8 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 DEMONSTRATION AND TRAINING

- A. Instruction: Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system. Develop a training with Owner, through Architect, with at least seven days' notice.

1. Provide instructors experienced in operation and maintenance procedures. Incorporate nontoxic cleaning methods and sustainable maintenance.
 2. Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.
 3. Schedule training with Owner, through Architect, with at least seven days' advance notice.
 4. Coordinate instructors, including providing notification of dates, times, length of instruction, and course content.
- B. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections. For each training module, develop a learning objective and teaching outline. Include instruction for the following:
1. System design and operational philosophy.
 2. Review of documentation.
 3. Operations.
 4. Adjustments.
 5. Troubleshooting.
 6. Maintenance.
 7. Repair.
 8. Recycling.

3.2 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and anti-pollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a 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 a smooth, even-textured surface.

- d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - m. Wipe surfaces of mechanical and electrical equipment, elevator 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 a 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 ducts, blowers, and coils if units were operated without filters during construction.
 - r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - s. Leave Project clean and ready for occupancy.
- C. Comply with safety and environmental standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

Use non-toxic and low-VOC cleaning products to the extent possible while complying with manufacturer's recommendations.

END OF SECTION

**SECTION 02 05 00
DEMOLITION AND ALTERATIONS**

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Demolition and alterations of existing facilities as indicated on drawings, as specified and directed by Architect.
- B. Removal, salvage, or other disposition of minor site improvements as specified on Drawings.

1.02 RELATED WORK:

- A. N/A

1.03 QUALITY ASSURANCE:

- A. Accomplish demolition and removal of existing construction, utilities, equipment, and appurtenances without damaging integrity of existing structures, equipment, and appurtenances that are to remain.
- B. Store equipment to be salvaged for relocation where directed by Architect, and if necessary, protect from damage during work.
- C. Exercise all necessary precautions for fire prevention. Acceptable fire extinguishers made available at all times in areas where demolition work by burning torches is being done. Burning of demolition debris not permitted on or near site.
- D. Provide protection of persons and property throughout progress of work. Proceed in such manner as to minimize spread of dust and flying particles and to provide safe working conditions for personnel.
- E. Maintain circulation of traffic within area at all times during demolition operations.
- F. Obtain permission from Architect before abandoning or removing any existing structures, materials, equipment and appurtenances.
- G. Arrange with and perform work required by utility companies and municipal departments for discontinuance or interruption of utility services due to demolition work.

1.04 SUBMITTALS:

Submit demolition plan to Architect for review, describing proposed sequence, methods, and equipment for demolition and disposal of each structure.

PART 2 - PRODUCTS (NOT

APPLICABLE) PART 3 -

EXECUTION

3.01 DEMOLITION:

- A. Confine apparatus, storage of material, demolition work, new construction, and operations of workmen to areas that will not interfere with continued use and operation of entire facility. Provide and maintain lights, barriers, and temporary passageways for free and safe access.
- B. Wet down work during demolition operations to prevent dust from arising. Provide maximum practicable protection from inclement weather for materials, equipment, and personnel located in partially dismantled structures. Provide shoring or bracing where necessary to prevent settlement or displacement of existing or new structures. Do not overload floors. Complete demolition work on upper levels before disturbing supporting members on lower levels.

3.02 SALVAGE:

- A. Materials, equipment, and appurtenances removed, that are not designated for relocation, become property of Contractor and hauled from site and disposed of at no additional compensation.

* * *

PART 2 - PRODUCTS (NOT

APPLICABLE) PART 3 -

EXECUTION

3.01 DEMOLITION:

- A. Confine apparatus, storage of material, demolition work, new construction, and operations of workmen to areas that will not interfere with continued use and operation of entire facility. Provide and maintain lights, barriers, and temporary passageways for free and safe access.
- B. Wet down work during demolition operations to prevent dust from arising. Provide maximum practicable protection from inclement weather for materials, equipment, and personnel located in partially dismantled structures. Provide shoring or bracing where necessary to prevent settlement or displacement of existing or new structures. Do not overload floors. Complete demolition work on upper levels before disturbing supporting members on lower levels.

3.02 SALVAGE:

- A. Materials, equipment, and appurtenances removed, that are not designated for relocation, become property of Contractor and hauled from site and disposed of at no additional compensation.

* * *



Asbestos Containing Building Materials Inspection Report

Project:

Casa Foreman in
Camino Foreman, Carr 123
Km 29.9, Bo Potugués,
Adjuntas, Puerto Rico



Client:

Arquiteg – Architects & Planners

ZEM-22183

September 2022

Prepared By:

Zimmetry Environmental Management, Corp.
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SECTION 1: EXECUTIVE SUMMARY

1.1 INTRODUCTION

An Asbestos Containing Building Materials (ACBM) Inspection was conducted on September 9, 2022 at Casa Foreman located at Camino Foreman, Carretera 123 Km 29.9, Barrio Potugués in Adjuntas, Puerto Rico. The asbestos containing building materials sampling was performed to identify material that contains asbestos fibers above allowable levels and to assist with the compliance of local, state and federal regulations.

1.2 SUMMARY OF PROPERTY EVALUATION

The project consisted of the evaluation of the interior and exterior of the aforementioned property. The evaluation found that asbestos fibers were present at the selective materials. For specific locations and additional details on the location of ACBM reference Sections 2 and 3. If suspected components and surfaces that were not previously evaluated are identified in the facilities they shall be considered as containing asbestos until the appropriate analysis is performed.

1.3 PROPERTY LOCATIONS OF BUILDING COMPONENTS WITH ASBESTOS

Table 1-1 summarizes the property components containing asbestos fibers. Details that identify positive asbestos findings within specific areas and on surfaces were provided in the Asbestos Sampling inspection report, Section 2. The quantification of positives materials presented in Table 1-1 is only an estimate. If an abatement of the materials will be conducted the Contractors shall estimate the amount of materials to be abated. If homogeneous materials that were not accounted for are identified in areas that are not described they shall be managed as asbestos containing material.

Table 1-1: Summary of Building Components Containing Asbestos		
Location (Area)	Component	Amount (Approx.)
Bathroom 1 & Kitchen	Baseboard Adhesive	27 Ft ²
	Rigid Panel	182 Ft ²
	Vinyl Tile (9x9) & Associate Black Mastic ¹	278 Ft ²

Note:

1. In selective areas there are multiple layers of floor vinyl tiles installed. Asbestos-containing vinyl tiles associated black mastic is located in the 2nd layer.

SECTION 2: ASBESTOS CONTAINING BUILDING MATERIALS INSPECTION REPORT

2.1 OVERVIEW OF THE EVALUATION

This ACBM inspection is an evaluation to identify the location of material containing asbestos that exist within. Our scope of work services for this project consisted of the following tasks.

- A walk-through and observation of the site was performed.
- Bulk sampling of Suspected ACBM within the structure.
- Polarized Light Microscopy (PLM) Analysis of bulk samples.
- Final Inspection Report.

Throughout the inspection the following suspected ACBM were observed and sampled:

- Baseboard
- Rigid Panel
- Vinyl Tile (9x9)

The sampling was conducted by the Department of Natural and Environmental Resources (DRNA) of Puerto Rico and United States Environmental Protection Agency (USEPA) accredited Inspectors qualified by experience, education and training in the recognition of potential ACBM and approved bulk sampling techniques. Some areas may not have been directly accessible due to the physical hazards encountered within. In these areas, if any, assumptions based on findings in other areas were made whenever possible. These assumptions, if any, are duly noted as such in this report.

The inspection was performed in accordance with Environmental Protection Agency recommended procedures found in EPA-450/2-78-014 (Parts I and II), EPA 560/5-85-024, and 40 CFR 763. These procedures call for the visual inspection of the building for suspect friable material and collection and analysis of representative samples of suspect material.

2.2 SAMPLING PROCEDURE AND RESULTS PRESENTATION

The bulk sampling procedures utilized for the collection of the ACBM, required the establishment of homogeneous sampling areas. A homogeneous sampling area is defined as an area of friable or non-friable material of similar type that appears to be applied or constructed during the same time period.

Samples collected from these predetermined homogeneous sampling areas were labeled and transported for analysis. Sample locations were identified by their current use or functional space name. Each type of asbestos displays a unique property when subject to PLM. Properties are unique to crystalline asbestos form and; therefore, can be used to identify the type of asbestos mineral as chrysotile, amosite, crocidolite, anthophyllite, tremolite and actinolite.

Percentage of each asbestos mineral type is determined by visual estimation, by mixing the sample thoroughly to provide a more accurate percentage. Any material containing over one percentage (>1%) by weight of any type of asbestos mineral forms is considered by the USEPA to be asbestos containing material; and if disturbed, it must be handled according to specific State and Federal Regulations.

Eight (8) samples of suspected materials were collected. It is our opinion that an acceptable minimum number of critical areas were sampled in keeping with the homogeneous nature of much of the material that was observed. Non-destructive sampling techniques were used. If they exist, walls, ceilings, columns and other inaccessible areas were not broken into. It should be noted that these inaccessible areas may contain ACBM which was not observed during the inspection. Any future construction or renovation should anticipate the presence of these materials.

The samples were received and analyzed by Analytical Environmental Services, Inc. in Atlanta GA (Certified Proficient by the National Institute of Science and Technology NVLAP program for bulk sample asbestos analysis; Laboratory Id 102082-0). The method of analysis was polarized light microscopy with dispersion staining, as recommended by the US EPA. This survey focused on the building materials, which are present throughout the interior and exterior of the building structure.

2.3 FINDINGS AND RECOMMENDATIONS

2.3.1 INTRODUCTION

This section describes the asbestos containing building materials (ACBM), which were observed in the inspection. Please note that the recommendations given are always the minimum action, which in our professional judgment should be taken.

There were three type of Asbestos Containing Building Materials found within the evaluated property:

- Baseboard
- Rigid Panel
- Vinyl Tile (9x9)

If these materials are to be removed they should be managed and disposed by a licensed asbestos contractor and disposed of as contaminated waste in as approved asbestos landfill site.

2.3.2 SPECIFIC FINDINGS

The following ACBM were found to contain more than one percent (1%) of asbestos by weight and are listed according to their homogeneous area:

1. Baseboard Adhesive Samples: 22183-06

These materials are in a non-friable condition and the analytical result was 5% Chrysotile asbestos.

2. Rigid Panel Samples: 22183-07 and 22183-08

These materials are in a non-friable condition and the analytical result was 15% Chrysotile asbestos.

3. Vinyl Tile (9x9) & Associate Black Mastic Samples: 22183-03, 22183-04 and 22183-05

These materials are in a non-friable condition and the analytical result range between 2% to 3% Chrysotile asbestos.

2.3.3 HOMOGENEOUS AREAS WITH SPECIAL CONSIDERATIONS

NONE

2.3.4 SUSPECT MATERIALS PRESUMED TO BE ASBESTOS-CONTAINING MATERIALS WITHOUT LABORATORY ANALYSIS

NONE

2.3.5 INACCESSIBLE AREAS

NONE

2.4 CONDITIONS AND LIMITATIONS—DISCLAIMER

Zimmetry Environmental Management Corp. has performed this asbestos containing building materials inspection in a thorough and professional manner consistent with commonly accepted industry standards. The Preparer cannot guarantee and does not warrant that this evaluation has identified all adverse environmental factors and/or conditions affecting this property on the date of the evaluation. If suspected materials are identified they shall be managed as containing asbestos until the appropriated laboratory analysis is performed. The quantification of positives materials presented in the table 1-1 is only an estimate. If an abatement of the materials will be conducted the Contractors shall estimate the amount of the materials to be abated.

The results reported and conclusions reached by the Preparer are solely for the benefit of the Owner and occupants. The results and opinions in this report, based solely on the conditions found at the property on the date of the evaluation, are valid only on that date. The Preparer assumes no obligation to advise the client of any changes in any real or potential asbestos hazards at this structure beyond the date of the property evaluation.

2.5 ABATEMENT CONDITIONS

The US Environmental Protection Agency rules concerning the application, removal, and disposal of Asbestos Containing Building Materials (ACBM) were issued under the asbestos NESHAP (U.S. EPA National Emission Standards of Hazardous Air Pollutants, 40 CFR 61 Subpart M, October 30, 1987). The asbestos **N.E.S.H.A.P.** regulation governs asbestos demolition and renovation projects in all facilities. The NESHAP rule usually requires owners or operators to have all friable ACBM removed before a building is demolished, and may require its removal before a renovation. The Department of Natural and Environmental Resources (DRNA) of Puerto Rico requires inspecting the presence of Asbestos Containing Materials prior to buildings demolitions.

If the identified materials are to be removed, they should be managed following the work practices and procedures for the removal and disposal of asbestos containing materials by a licensed asbestos

contractor and disposed of as contaminated waste in as approved asbestos landfill site. The Contractor shall comply with all the Department of Natural and Environmental Resources (DRNA) of Puerto Rico requirements. The Contractor has to submit to the DRNA the abatement work plan for its approval. The asbestos abatement is classified Class II for the miscellaneous materials by OSHA, which includes the abatement, packing and storage of asbestos. The abatement has to be performed without damaging any structure or adjacent area and protecting the safety and health of the employees and the general public.

2.6 ENVIRONMENTAL ASSESSMENT REPORT CERTIFICATION

Zimmetry Environmental Management Corp. has performed this asbestos containing building materials inspection in a thorough and professional manner consistent with commonly accepted industry standards. The ACBM inspection was performed on September 9, 2022 by Ramón Rosado, ASB-1121-0598-SI, qualified by experience, education and training in the recognition of asbestos containing materials and approved sampling techniques.



Ramón Rosado
Environmental Building Consultant

SECTION 3: APPENDICES

Appendix A: Certifications, Licenses and Accreditations

Appendix B: Laboratory Results & Chain of Custody

Appendix C: Photographic Record

Appendix D: Location of Positive Materials

APPENDIX A: CERTIFICATIONS, LICENSES, AND ACCREDITATIONS

	TARJETA DE REGISTRO LA REMOCION PARA DE ASBESTO
	Esta tarjeta autoriza a:
	<u>Ramón Rosado Izquierdo</u>
	Inspector
	A trabajar en la remoción de asbesto en Puerto Rico. Esta persona NO es un empleado del DRNA.
ASB-1121-0598-SI	
Número de Registro	Firma Autorizada - Departamento
<u>2-Nov-2022</u>	Recursos Naturales y Ambientales
Fecha de vencimiento	

APPENDIX A: CERTIFICATIONS, LICENSES, AND ACCREDITATIONS

United States Department of Commerce National Institute of Standards and Technology	
	
Certificate of Accreditation to ISO/IEC 17025:2017	
NVLAP LAB CODE: 102082-0	
Analytical Environmental Services, Inc. Atlanta, GA	
<i>is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:</i>	
Asbestos Fiber Analysis	
<i>This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).</i>	
2021-10-01 through 2022-09-30 Effective Dates	  For the National Voluntary Laboratory Accreditation Program

APPENDIX B: LABORATORY RESULTS AND CHAIN OF CUSTODY

ZIMMETRY ENVIRONMENTAL MANAGEMENT CORP.

PO BOX 3545 BAYAMÓN, PR 00958

(787)376-9010 Phone (787)995-0005 Fax

email: hpena@zimmetry.com Web: www.zimmetry.com

Analytical Environmental Services, Inc.

Accounts Receivable

3080 Presidential Drive, Atlanta GA 30340-3704

Phone (770) 457-8177 Fax (770) 457-8188

CHAIN OF CUSTODY

BULK ASBESTOS SAMPLE

2209D66

Project Name: Los Foreman Residence

Contact: Harry Peña

Project Location: Adjuntas, PR

Samplers Name: Ramón Rosado

Project Number: ZEM-22183

Sampling Date: 9/9/2022

	Sample ID	Sample Description	Sample Location	Analysis Requested	Turnaround Time	Comments	For AES Use Only
1	22183-03	Blue Vinyl Tile (9x9)	Bathroom 1	PLM	3 Days		
2	22183-04	Blue Vinyl Tile (9x9)	Kitchen	PLM	3 Days		
3	22183-05	Blue Vinyl Tile (9x9)	Kitchen	PLM	3 Days		
4	22183-06	Baseboard Adhesive	Bathroom 1	PLM	3 Days		
5	22183-07	Rigid Panel	Bathroom 1	PLM	3 Days		
6	22183-08	Rigid Panel	Bathroom 1	PLM	3 Days		
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

Relinquished by: Alicia García

Date/Time: 9/13/2022 15:00

FOR LAB USE ONLY

Lab Recipient: CCOP

Date/Time: 9.14.22

Method of Shipment: Fedex



3080 Presidential Drive
Atlanta, GA 30340
Tel : (770) 457-8177
Fax: (770) 457-8188

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

Bulk Sample Summary Report



Report Date: 19-Sep-22

Client Name: **Zimmetry Environmental Mgmt Corp.**

AES Job Number: **2209D66**

Project Name: **Los Foreman Residence**

Project Number: **ZEM-22183**

Client ID	AES ID	Location	Asbestos Mineral Percentage						Comments
			CH	AM	CR	AN	TR	AC	
22183-03 Layer: 1	2209D66 -001A	Blue Vinyl Tile (9x9)	2	ND	ND	ND	ND	ND	Floor tile
22183-03 Layer: 2	2209D66 -001A	Blue Vinyl Tile (9x9)	3	ND	ND	ND	ND	ND	Black mastic
22183-04 Layer: 1	2209D66 -002A	Blue Vinyl Tile (9x9)	2	ND	ND	ND	ND	ND	Floor tile
22183-04 Layer: 2	2209D66 -002A	Blue Vinyl Tile (9x9)	3	ND	ND	ND	ND	ND	Black mastic
22183-05 Layer: 1	2209D66 -003A	Blue Vinyl Tile (9x9)	2	ND	ND	ND	ND	ND	Floor tile
22183-05 Layer: 2	2209D66 -003A	Blue Vinyl Tile (9x9)	3	ND	ND	ND	ND	ND	Black mastic

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophyllite

For comments on the samples, see the individual analysis sheets.

ND = None Detected

AES, Inc. is accredited by NIST's National Voluntary Laboratory Accreditation Program (NVLAP) for Polarized Light Microscopy (PLM) analysis, Lab Code 102082-0. All analyses performed in accordance with EPA "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" (EPA 600/M4-82-020), 1982 as found in 40 CFR, Part 763, Appendix E to Subpart E and "Method for the Determination of Asbestos in Bulk Building Materials" (EPA/600/R-93/116), 1993.

These test results apply only to those samples actually tested, as submitted by the client. All percentages are reported by visually estimated volume.

PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials, quantitative TEM is currently the only method that can be used to determine conclusive asbestos content.

This report must not be reproduced except in full without written approval of Analytical Environmental Services, Inc.

Microanalyst:

Elena Ivanova

QC Analyst:

Yelena Khanina



3080 Presidential Drive
Atlanta, GA 30340
Tel : (770) 457-8177
Fax: (770) 457-8188

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

Bulk Sample Summary Report



Report Date: 19-Sep-22

Client Name: **Zimmetry Environmental Mgmt Corp.**

AES Job Number: **2209D66**

Project Name: **Los Foreman Residence**

Project Number: **ZEM-22183**

Client ID	AES ID	Location	Asbestos Mineral Percentage						Comments
			CH	AM	CR	AN	TR	AC	
22183-06 Layer: 1	2209D66 -004A	Baseboard Adhesive	5	ND	ND	ND	ND	ND	Black mastic
22183-07 Layer: 1	2209D66 -005A	Rigid Panel	15	ND	ND	ND	ND	ND	Panel. Paint included as binder
22183-07 Layer: 2	2209D66 -005A	Rigid Panel	ND	ND	ND	ND	ND	ND	
22183-08 Layer: 1	2209D66 -006A	Rigid Panel	15	ND	ND	ND	ND	ND	Panel. Paint included as binder
22183-08 Layer: 2	2209D66 -006A	Rigid Panel	ND	ND	ND	ND	ND	ND	

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophyllite

For comments on the samples, see the individual analysis sheets.

ND = None Detected

AES, Inc. is accredited by NIST's National Voluntary Laboratory Accreditation Program (NVLAP) for Polarized Light Microscopy (PLM) analysis, Lab Code 102082-0. All analyses performed in accordance with EPA "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" (EPA 600/M4-82-020), 1982 as found in 40 CFR, Part 763, Appendix E to Subpart E and "Method for the Determination of Asbestos in Bulk Building Materials" (EPA/600/R-93/116), 1993.

These test results apply only to those samples actually tested, as submitted by the client. All percentages are reported by visually estimated volume.

PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials, quantitative TEM is currently the only method that can be used to determine conclusive asbestos content.

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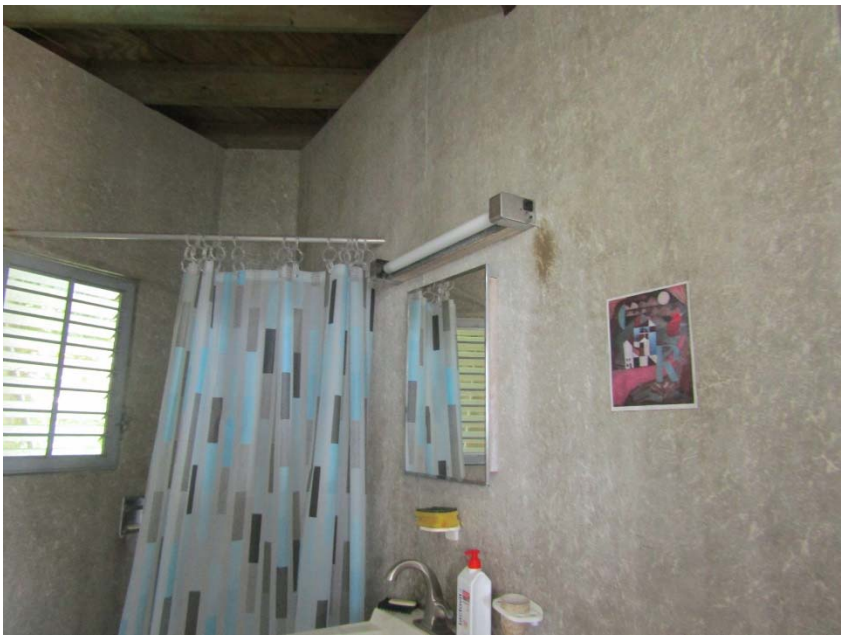
Microanalyst:

Elena Ivanova

QC Analyst:



Yelena Khanina

APPENDIX C: PHOTOGRAPHIC RECORD

Photo No. 5456	Date: 9/9/2022	
Description: Bathroom 1 Asbestos containing baseboard adhesive.		
Photo No. 5454	Date: 9/9/2022	
Description: Bathroom 1 Asbestos containing rigid panel.		

Photographic Documentation is for reference purposes and doesn't necessarily include all the surfaces with asbestos.

APPENDIX C: PHOTOGRAPHIC RECORD

Photo No. 5455	Date: 9/9/2022	
Description: Bathroom 1 Asbestos containing rigid panel.		
Photo No. 5457	Date: 9/9/2022	
Description: Kitchen Asbestos containing rigid panel.		

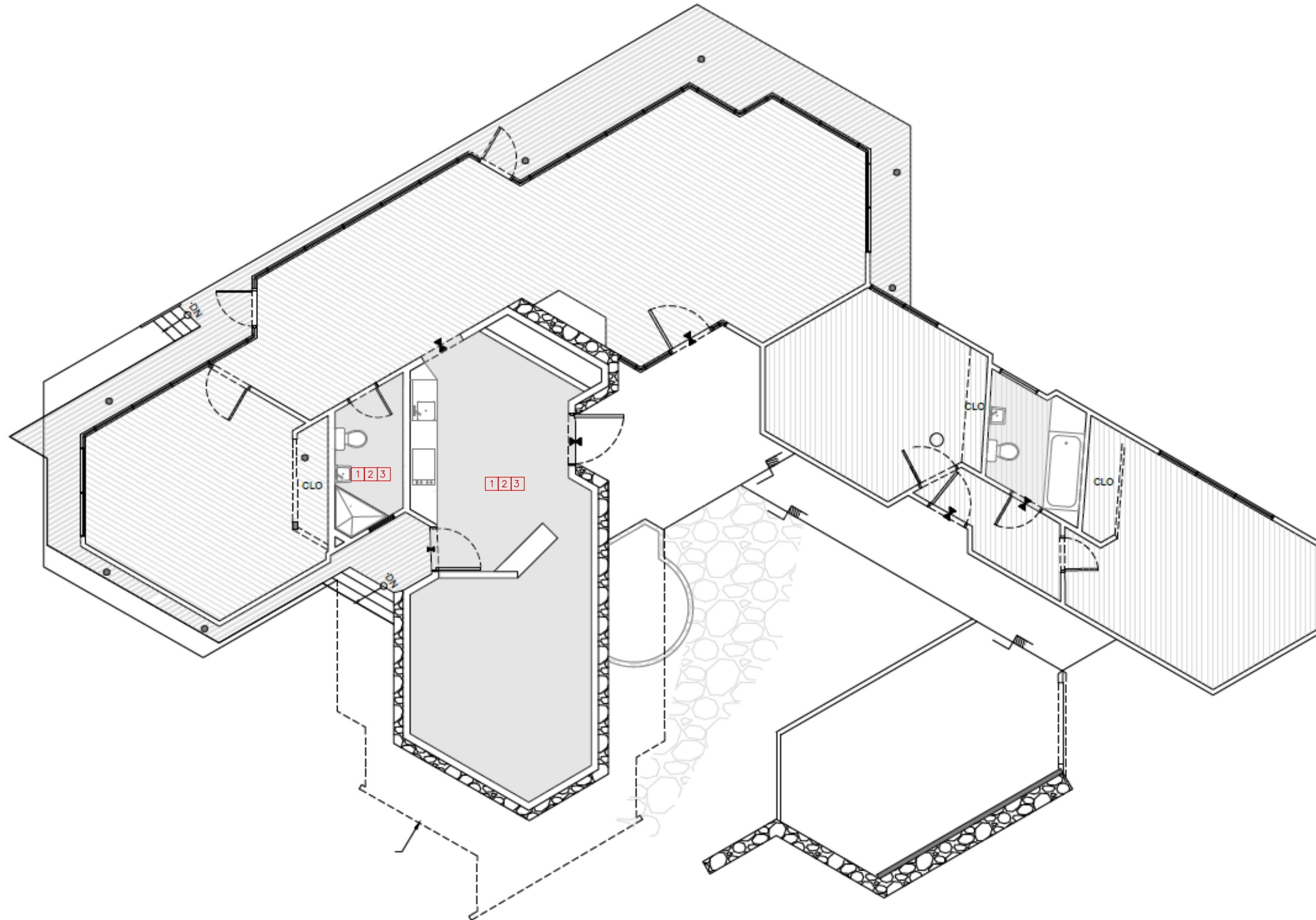
Photographic Documentation is for reference purposes and doesn't necessarily include all the surfaces with asbestos.

APPENDIX C: PHOTOGRAPHIC RECORD

Photo No. 5450	Date: 9/9/2022	
Description: Bathroom 1 Asbestos containing vinyl tile (9x9) & associate black mastic.		
Photo No. 5449	Date: 9/9/2022	
Description: Kitchen Asbestos containing vinyl tile (9x9) & associate black mastic.		

Photographic Documentation is for reference purposes and doesn't necessarily include all the surfaces with asbestos.

APPENDIX D: LOCATION OF POSITIVE MATERIALS



AS-BUILT FLOOR PLAN

Note:

The layout of materials shown in this figure is for illustrative purposes only. For actual location and quantity of materials refer to the asbestos survey report dated

Asbestos Legend:

- 1
- 2
- 3

Zimmetry Environmental Environmental Building Inspectors Indoor Environmental Quality / Mold Assessments, Asbestos, Lead Based Paint Consulting – Phone – Fax (787) 995-0005	
Project:	
Date:	Project No:



Lead Based Paint Inspection Report

Project:

Casa Foreman in
Camino Foreman, Carr 123
Km 29.9, Bo Potugués,
Adjuntas, Puerto Rico



Client:

Arquiteg – Architects & Planners

ZEM-22183

September 2022

Prepared By:

Zimmetry Environmental Management, Corp.
www.zimmetry.com
info@zimmetry.com

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SECTION 1: EXECUTIVE SUMMARY

1.1 INTRODUCTION

A Lead-Based Paint inspection was conducted on September 9, 2022 at Casa Foreman located at Camino Foreman, Carretera 123 Km 29.9, Barrio Potugués in Adjuntas, Puerto Rico. The lead-based paint inspection was performed to identify paint that contains lead above allowable levels and to assist with the compliance of local, state and federal regulations.

1.2 SUMMARY OF PROPERTY EVALUATION

The project consisted of the evaluation of the interior and exterior areas of the aforementioned property. The evaluation found that lead based paint was present in selective components and surfaces through the property on the date of the inspection. Table 1-1 identifies the components positive for lead. Table 2-1 identifies lead-based paint as defined by the U.S. Environmental Protection Agency (EPA) and the Department of Natural and Environmental Resources (DRNA) of Puerto Rico. For specific locations and additional detail on the location of lead- reference Sections 2 and 3.

1.3 PROPERTY LOCATIONS OF BUILDING COMPONENTS WITH LEAD-BASED PAINT

Table 1-1 summarizes the site components and surfaces coated with lead-based paint. Details that identify positive lead-based paint findings within specific areas and on surfaces were provided in the lead-based paint inspection report. The “substrate” is the building component material directly beneath the painted surface. Photographic documentation is for reference purposes and doesn't necessarily include all the surfaces with lead based paint and/or components containing lead. The quantification of positives materials presented in this table is only an estimate. If an abatement of the materials will be conducted, the Contractors shall estimate the amount of materials to be abated.

If homogeneous materials that were not accounted for are identified in areas that are not describe in this report or inaccessible areas described in Section 2.3.3, they shall be managed as containing lead. If suspected components that could contain lead are encountered underneath current installed tiles or other construction material, they shall be managed as containing lead until the appropriate test is performed. Refer to Appendix E: Location of Positive Materials for specific location.

Table 1-1: Summary of Components Containing Lead				
Area	Component	Color	Substrate	Approximate Amount
Kitchen	Wall Tiles	Blue	Ceramic	56 Ft ²
	Counter Top Tiles			
Bathroom 2	Bathtub			1 Unit

Note:

1. The quantification of positives materials presented in this table is only an estimate. If an abatement of the materials will be conducted, the Contractors shall estimate the amount of materials to be abated.

SECTION 2: LEAD-BASED PAINT INSPECTION REPORT

2.1 OVERVIEW OF THE EVALUATION

This lead-based paint inspection is an investigation to identify all lead-based paint on a surface-by-surface basis. A lead-based paint inspection conforming to HUD guidelines was performed at the aforementioned property.

Averages of 53 samples were taken at identified surfaces of the evaluated areas using X-ray fluorescence (XRF) analyzer. The evaluation found that lead-based paint was present in selective components and surfaces through the property on the date of the assessment (See Table 1-1).

Some of the remaining XRF test locations exhibited lead-in-paint levels below the level that EPA identifies as lead-based paint, namely 1.0 mg/cm². Such surfaces could create dust-lead or soil-lead hazards if the paint is turned into dust by abrasion, scraping, or sanding. Should these or any lead containing components or surfaces be disturbed in any manner that generates dust, care should be taken to limit its spread.

Testing was performed by Dilia Rosado, state-certified risk assessor LBPRA-20322-195, using the Niton XLp-300A XRF, SN-101222. The credentials are provided in Section 3, Appendix A: Certifications, Licenses, and Accreditations. The XRF analyzer is designed to measure the lead content of surface coatings on a variety of building surfaces, substrates, and components. The measurement is rapid and nondestructive and, according to the manufacturer, is capable of detecting lead concentrations that occur within numerous layers of various surface coatings.

Please refer to the XRF Testing Results Section 3, Appendix B: XRF Sampling Data for the detailed analytical testing results for each distinct area inspected. The reports provide a complete testing data.

2.2 SAMPLING PROCEDURE

The Lead Based Paint Sampling Procedure was design to evaluate and document all the data obtained form the inspection in a sequential method that provided confidence at the moment of the results presentation.

The survey was performed following the methodology established in the HUD Guidelines for the Evaluation and Control of Lead Based Paint in Housing (2012 revision) and the Department of Natural and Environmental Resources (DRNA) of Puerto Rico Regulation 9098: Regulation for Proper Management of Lead-Based Paint Activities. The surfaces evaluation was performed as follows:

- If the lead concentration measured by the XRF Spectrum Analyzer is less than 1.0 mg/cm² it is considered negative.
- If the lead concentration measured by the XRF Spectrum Analyzer is equal or greater than 1.0 mg/cm² it is considered positive.

To each functional space of the property a name was assigned according to the use of that space. If no name could be assigned then a code letter or number was assigned.

Each wall surface was named with letters beginning with wall A the wall facing the main entrance direction. The wall at your left will be wall B, the wall at front wall C and the wall at you right will be wall D.

2.3 RESULTS PRESENTATION

This section describes the property components and surfaces coated with lead-based paint (LBP), which were observed in the inspection. Please note that the recommendations given are always the minimum action, which in our professional judgment should be taken.

According to the DRNA lead regulations, prior to the demolishing of a structure containing lead-based paint, the contaminated surfaces or substrates must be abated or removed. The firm providing the abatement services must be certified as an abatement firm by the DRNA.

2.3.1 SPECIFIC FINDINGS

The following LBP were found to contain more than 1.0 mg/cm² for what Department of Natural and Environmental Resources (DRNA) of Puerto Rico identifies as lead-based paint or materials containing lead:

- Bathtub
- Counter Top Tiles
- Wall Tiles

2.3.2 HOMOGENEOUS AREAS WITH SPECIAL CONSIDERATIONS

NONE

2.3.3 INACCESSIBLE AREAS PRESUMED TO BE LEAD-BASED PAINTED

NONE

2.4 LEAD REGULATORY LEVELS

The lead regulatory levels provided below are those used when preparing this lead-based paint evaluation or when evaluating data collected. The EPA regulatory levels are the same as the state regulatory levels provided in the following table.

TABLE 2-1: LEAD REGULATORY LEVELS	
	EPA/DRNA Levels
Lead-Based Paint	1.0 mg/cm² or 0.5% by weight (or 5,000 ppm)

2.5 CONDITIONS AND LIMITATIONS—DISCLAIMER

Zimmetry Environmental Management Corp. has performed this lead-based paint inspection in a thorough and professional manner consistent with commonly accepted industry standards. The Preparer cannot guarantee and does not warrant that this evaluation has identified all adverse environmental factors and/or conditions affecting this property on the date of the evaluation.

The results reported and conclusions reached by the Preparer are solely for the benefit of the Owner. The results and opinions in this report, based solely on the conditions found at the property on the date of the evaluation, are valid only on that date. The Preparer assumes no obligation to advise the client of any changes in any real or potential lead-based paint hazards at this property beyond the date of the evaluation.

The lead inspection was performed to ready accessible components and surfaces. If suspected components that could contain lead are encountered underneath current installed tiles or other construction material, they shall be managed as containing lead until the appropriate test is performed.

2.6 ABATEMENT CONDITIONS

Abatement, as defined by HUD and the Department of Natural and Environmental Resources (DRNA) of Puerto Rico, means any set of measures designed to eliminate lead-based paint and/or lead-based paint hazards permanently. The people providing these services must to be trained in accordance with the DRNA licensing/certification requirements. The product manufacturer and/or contractor must warrant abatement methods to last a minimum of 20 years, or these methods must have a design life of at least 20 years.

- onsite or offsite removal of lead-based paint from substrates and components
- replacement of components or fixtures painted with lead-based paint
- permanent enclosure of lead-based paint with construction materials mechanically-fastened to the substrate
- encapsulation of lead-based paint with specially designed encapsulant products

- removal or permanent covering (concrete or asphalt) of soil-lead-based paint hazards

If enclosure or encapsulation is conducted as an abatement method, the lead-based paint remains on the property, so ongoing lead-based paint maintenance is required.

2.7 RECOMMENDATIONS

According to the DRNA lead regulations, prior to the demolishing of a structure containing lead-based paint, the contaminated surfaces or substrates must be abated or removed. The waste generated has to be characterized to determine if the waste generated is hazardous or non-hazardous waste. The firm providing the abatement services must be certified as an abatement firm by the DRNA. Workers conducting abatement must be trained and certified as abatement workers by a training provider accredited by the DRNA.

2.8 ENVIRONMENTAL ASSESSMENT REPORT CERTIFICATION

Zimmetry Environmental Management Corp. has performed this lead-based paint inspection in a thorough and professional manner consistent with commonly accepted industry standards. The inspection was conducted on September 9, 2022 by Dilia Rosado, state-certified risk assessor LBPRA-20322-195, qualified by experience, education and training in the recognition of lead-based paint and approved sampling techniques using the Niton XLP-300A XRF, SN-101222.



Dilia Rosado, MEM
Environmental Risk Assessor

SECTION 3: APPENDICES

Appendix A: Certifications, Licenses, and Accreditations

Appendix B: XRF Sampling Data

Appendix C: XRF's Performance Characteristics Sheet

Appendix D: Photographic Record

Appendix E: Location of Positive Materials

APPENDIX A: CERTIFICATIONS, LICENSES, AND ACCREDITATIONS



APPENDIX A: CERTIFICATIONS, LICENSES, AND ACCREDITATIONS



APPENDIX B: XRF SAMPLING DATA

[illegible]

APPENDIX C: XRF's PERFORMANCE CHARACTERISTICS SHEET

Performance Characteristic Sheet

EFFECTIVE DATE: September 24, 2004

EDITION NO.: 1

MANUFACTURER AND MODEL:

Make: Niton LLC

Tested Model: XLp 300

Source: ^{109}Cd

Note: This PCS is also applicable to the equivalent model variations indicated below, for the Lead-in-Paint K+L variable reading time mode, in the XLi and XLp series:

XLi 300A, XLi 301A, XLi 302A and XLi 303A.

XLp 300A, XLp 301A, XLp 302A and XLp 303A.

XLi 700A, XLi 701A, XLi 702A and XLi 703A.

XLp 700A, XLp 701A, XLp 702A, and XLp 703A.

Note: The XLi and XLp versions refer to the shape of the handle part of the instrument. The differences in the model numbers reflect other modes available, in addition to Lead-in-Paint modes. The manufacturer states that specifications for these instruments are identical for the source, detector, and detector electronics relative to the Lead-in-Paint mode.

FIELD OPERATION GUIDANCE

OPERATING PARAMETERS:

Lead-in-Paint K+L variable reading time mode.

XRF CALIBRATION CHECK LIMITS:

0.8 to 1.2 mg/cm² (inclusive)

The calibration of the XRF instrument should be checked using the paint film nearest 1.0 mg/cm² in the NIST Standard Reference Material (SRM) used (e.g., for NIST SRM 2579, use the 1.02 mg/cm² film).

If readings are outside the acceptable calibration check range, follow the manufacturer's instructions to bring the instruments into control before XRF testing proceeds.

SUBSTRATE CORRECTION:

For XRF results using Lead-in-Paint K+L variable reading time mode, substrate correction is not needed for:

Brick, Concrete, Drywall, Metal, Plaster, and Wood

INCONCLUSIVE RANGE OR THRESHOLD:

K+L MODE READING DESCRIPTION	SUBSTRATE	THRESHOLD (mg/cm ²)
Results not corrected for substrate bias on any substrate	Brick	1.0
	Concrete	1.0
	Drywall	1.0
	Metal	1.0
	Plaster	1.0
	Wood	1.0

BACKGROUND INFORMATION

EVALUATION DATA SOURCE AND DATE:

This sheet is supplemental information to be used in conjunction with Chapter 7 of the HUD *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* ("HUD Guidelines"). Performance parameters shown on this sheet are calculated from the EPA/HUD evaluation using archived building components. Testing was conducted in August 2004 on 133 testing combinations. The instruments that were used to perform the testing had new sources; one instrument's was installed in November 2003 with 40 mCi initial strength, and the other's was installed June 2004 with 40 mCi initial strength.

OPERATING PARAMETERS:

Performance parameters shown in this sheet are applicable only when properly operating the instrument using the manufacturer's instructions and procedures described in Chapter 7 of the HUD Guidelines.

SUBSTRATE CORRECTION VALUE COMPUTATION:

Substrate correction is not needed for brick, concrete, drywall, metal, plaster or wood when using Lead-in-Paint K+L variable reading time mode, the normal operating mode for these instruments. If substrate correction is desired, refer to Chapter 7 of the HUD Guidelines for guidance on correcting XRF results for substrate bias.

EVALUATING THE QUALITY OF XRF TESTING:

Randomly select ten testing combinations for retesting from each house or from two randomly selected units in multifamily housing. Use the K+L variable time mode readings.

Conduct XRF retesting at the ten testing combinations selected for retesting.

Determine if the XRF testing in the units or house passed or failed the test by applying the steps below.

Compute the Retest Tolerance Limit by the following steps:

Determine XRF results for the original and retest XRF readings. Do not correct the original or retest results for substrate bias. In single-family housing a result is defined as the average of three readings. In multifamily housing, a result is a single reading. Therefore, there will be ten original and ten retest XRF results for each house or for the two selected units.

Calculate the average of the original XRF result and retest XRF result for each testing combination.

Square the average for each testing combination.

Add the ten squared averages together. Call this quantity C.

Multiply the number C by 0.0072. Call this quantity D.

Add the number 0.032 to D. Call this quantity E.

Take the square root of E. Call this quantity F.

Multiply F by 1.645. The result is the Retest Tolerance Limit.

Compute the average of all ten original XRF results.

Compute the average of all ten re-test XRF results.

Find the absolute difference of the two averages.

If the difference is less than the Retest Tolerance Limit, the inspection has passed the retest. If the difference of the overall averages equals or exceeds the Retest Tolerance Limit, this procedure should be repeated with ten new testing combinations. If the difference of the overall averages is equal to or greater than the Retest Tolerance Limit a second time, then the inspection should be considered deficient.

Use of this procedure is estimated to produce a spurious result approximately 1% of the time. That is, results of this procedure will call for further examination when no examination is warranted in approximately 1 out of 100 dwelling units tested.

TESTING TIMES:

For the Lead-in-Paint K+L variable reading time mode, the instrument continues to read until it is moved away from the testing surface, terminated by the user, or the instrument software indicates the reading is complete. The following table provides testing time information for this testing mode. The times have been adjusted for source decay, normalized to the initial source strengths as noted above. Source strength and type of substrate will affect actual testing times. At the time of testing, the instruments had source strengths of 26.6 and 36.6 mCi.

Testing Times Using K+L Reading Mode (Seconds)						
	All Data			Median for laboratory-measured lead levels (mg/cm ²)		
Substrate	25 th Percentile	Median	75 th Percentile	Pb < 0.25	0.25 ≤ Pb < 1.0	1.0 ≤ Pb
Wood Drywall	4	11	19	11	15	11
Metal	4	12	18	9	12	14
Brick Concrete Plaster	8	16	22	15	18	16

CLASSIFICATION RESULTS:

XRF results are classified as positive if they are greater than or equal to the threshold, and negative if they are less than the threshold.

DOCUMENTATION:

A document titled *Methodology for XRF Performance Characteristic Sheets* provides an explanation of the statistical methodology used to construct the data in the sheets, and provides empirical results from using the recommended inconclusive ranges or thresholds for specific XRF instruments. For a copy of this document call the National Lead Information Center Clearinghouse at 1-800-424-LEAD.

This XRF Performance Characteristic Sheet was developed by the Midwest Research Institute (MRI) and QuanTech, Inc., under a contract between MRI and the XRF manufacturer. HUD has determined that the information provided here is acceptable when used as guidance in conjunction with Chapter 7, Lead-Based Paint Inspection, of HUD's *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

APPENDIX D: PHOTOGRAPHIC RECORD

Photo No. 3712	Date: 9/9/2022	
Description: Kitchen Lead containing ceramic wall tiles.		
Photo No. 3713	Date: 9/9/2022	
Description: Kitchen Lead containing ceramic counter top tiles.		

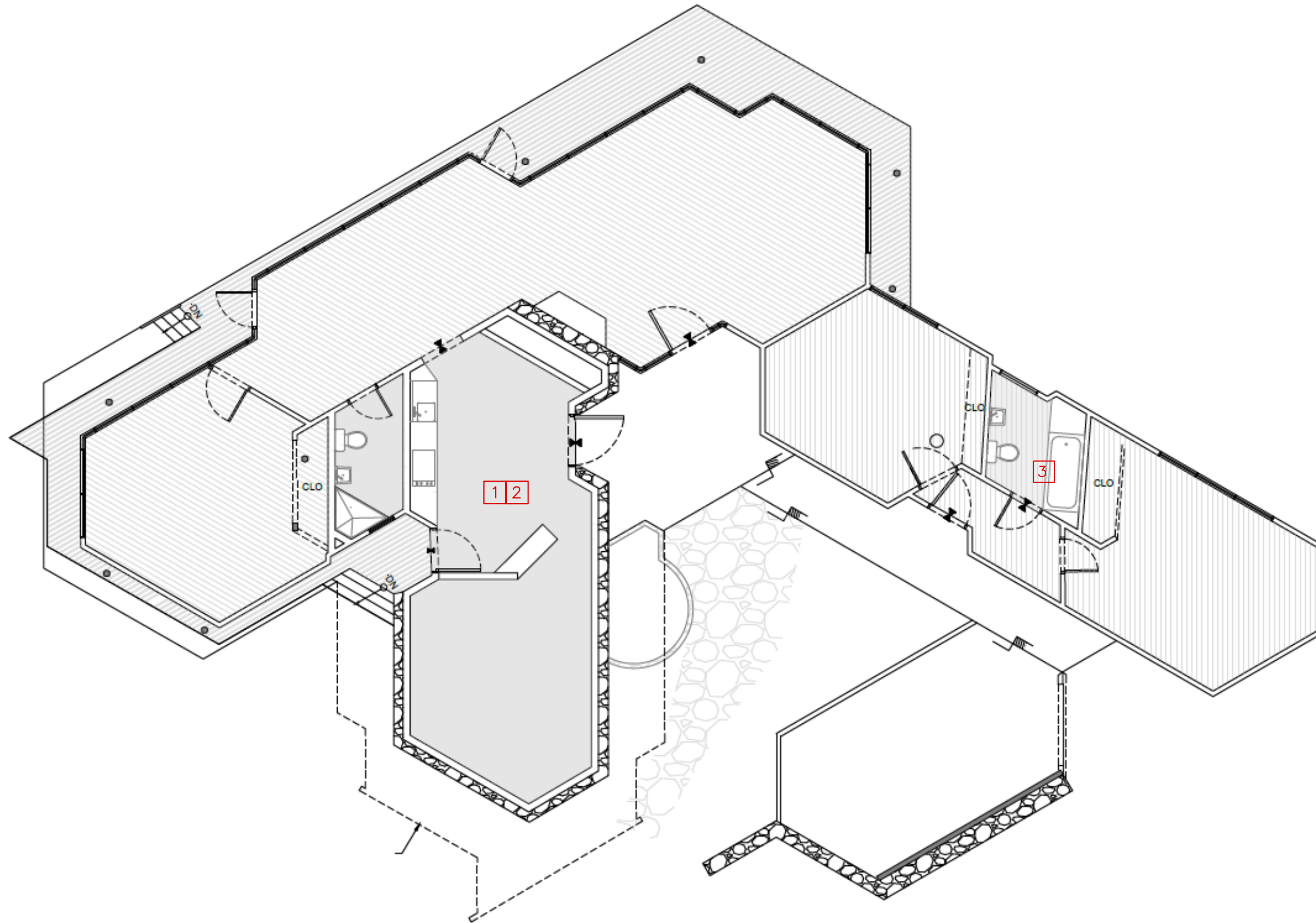
Photographic Documentation is for reference purposes and doesn't necessarily include all the surfaces with lead based paint and/or components containing lead.

APPENDIX D: PHOTOGRAPHIC RECORD

Photo No.	Date:	
3715	9/9/2022	
Description: Bathroom 2 Lead containing ceramic bathtub.		

Photographic Documentation is for reference purposes and doesn't necessarily include all the surfaces with lead based paint and/or components containing lead.

APPENDIX E: LOCATION OF POSITIVE MATERIALS



AS-BUILT FLOOR PLAN

Note:

The layout of materials shown in this figure is for illustrative purposes only. For actual location and quantity of materials refer to the Lead Based Paint survey report dated

Lead Legend:

- 1
- 2
- 3

Zimmetry Environmental Environmental Building Inspectors Indoor Environmental Quality / Mold Assessments, Asbestos, Lead Based Paint Consulting – Phone – Fax (787) 995-0005	
Project:	
Date:	Project No:

DIVISION 02 – EXISTING CONDITIONS

SECTION 02 82 13 – ASBESTOS ABATEMENT

1. INTRODUCTION

- 1.1 The Contractor shall perform all planning, administration, execution, and cleaning necessary to safely remove asbestos-containing or contaminated materials.
- 1.2 The Contractor shall obtain the following permits from the Department of Natural Resources and Environment (DNRE) in order to proceed with contract work.
 - 1.2.1 Asbestos Containing Materials General Permit
- 1.3 No architectural, engineering, or structural demolition or renovation work shall be executed before the asbestos-containing materials have been removed if the materials will be disturbed during such activities.
- 1.4 The Contractor and suppliers are responsible to comply with all the strictest, updated regulations/standards and codes and any changes that may occur during the contracted construction performance period.

2. DESCRIPTION OF THE ABATEMENT WORK

2.1 The asbestos abatement shall also include, but not be limited to the following:

- (a) Notification to regulatory agencies
- (b) Regulatory permits, licenses, and approvals
- (c) Worker health and safety program
- (d) Air monitoring
- (e) Construction of temporary containment barrier/decontamination enclosures
- (f) Preparation for abatement operations
- (g) Removal of existing asbestos-containing material
- (h) Transport and disposal of asbestos-containing material
- (i) Decontamination and cleaning
- (j) Application of lockdown encapsulants
- (k) Removal of temporary containment barrier/decontamination enclosures
- (l) Final job close-out

3. PERFORMANCE OF WORK

- 3.1 The Contractor shall be an Asbestos Hazard Control Contractor licensed to perform asbestos abatement work by the DNRE and shall meet the following requirements:
- 3.2 Maintain on-site one Superintendent, to remain on-site at all times that work is in progress. The superintendent shall be a Competent Person as defined in the Specifications and as required by OSHA.
 - 3.2.1 Use only trained and experienced asbestos abatement workers to perform the Work. All asbestos abatement workers assigned to tasks within this project shall be DNRE asbestos abatement workers/supervisors and shall have successfully completed training through an EPA-accredited curriculum.
- 3.3 The abatement shall be considered similar to an OSHA Class 2 asbestos abatement work, which includes the removal, packaging, and disposal of asbestos-containing materials related to the materials to be removed.
- 3.4 The Contractor and/or Environmental Sub-Contractor (s) shall perform the Work in accordance with 29 CFR 1926.11 01, 40 CFR 61-SUBPART A; 40 CFR 61SUBPART M, A.S.H.A.R.A. (Asbestos School Hazard Reauthorization Act) Rule 422 of the Atmospheric Air Control Regulation of Puerto Rico, Federal Department of Transportation (D.O.T.), Public Commission Service of Puerto Rico ("CSP"), rule 644 of the Non-Hazardous Waste Regulation of Puerto Rico and the requirements specified herein, as well as any other updated applicable federal, state or local government laws and regulations.
- 3.5 All other work described in the Specifications shall be performed according to applicable codes and standards, federal, state, and local regulations, and the Specifications and Drawings.

4. DEFINITIONS

- 4.1 Abatement: Procedures to control or eliminate fiber release from asbestos containing building materials including encapsulation, enclosure, and removal.
- 4.2 Abatement Work Area (regulated area): An area established by the employer to demarcate areas where Class I, II, III, and IV asbestos work is conducted, and any adjoining area where debris and waste from such

asbestos work accumulate; and a work area within which airborne concentrations of asbestos, exceed or there is a reasonable possibility they may exceed the permissible exposure limit.

- 4.3 Air Filtration Units: A local exhaust unit, utilizing HEPA filtration and capable of maintaining a minimum negative pressure differential of 0.05 mm of water within the containment barrier with respect to that of the environment surrounding the containment barrier.
- 4.4 Airlock: Two curtained doorways spaced a minimum of one meter apart from an airlock in the abatement worker/equipment decontamination and waste load-out enclosures.
- 4.5 Air Monitoring: The process of measuring the fiber content of a specific air volume during a stated period.
- 4.6 Air Pressure Monitoring: The process of measuring the air pressure differential between the containment barrier and the surrounding area using a micromanometer unit.
- 4.7 Amended Water: Water to which a surfactant (wetting agent) has been added to increase the ability of the liquid to penetrate ACM.
- 4.8 Asbestos: Asbestiform varieties of chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.
- 4.9 Asbestos-Containing Material (ACM): Any material containing more than 1% asbestos by volume of any type or mixture of types.
- 4.10 Clean Room: An uncontaminated area or room which is part of the abatement worker/equipment decontamination enclosure, with provisions for the storage of workers' or visitors' street clothing, protective equipment, and uncontaminated materials and equipment.
- 4.11 Competent Person: In addition to the definition in 29 CFR 1926.32 (f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32 (f). In addition, the competent person shall have successfully completed training for Class I, Class II, Class III, and Class IV projects meeting the criteria set forth in the EPA Model Accreditation Plan (40 CFR 763) for project designer or supervisor, and operations and maintenance training.

- 4.12 Containment Barrier: A temporary enclosure constructed with fire-retardant plastic sheeting, suitable framing, duct tape, and other adhesives within the abatement work area.
- 4.13 Critical Barrier: Those portions of the containment barrier which represent the minimum structural components necessary to maintain the asbestos removal area in airtight isolation from the surrounding areas.
- 4.14 Decontamination Enclosure: A series of connected rooms with curtained doorways between each room, for the decontamination of the abatement workers and equipment/materials.
- 4.15 Encapsulant: A material applied after the removal of ACM or to the ACM-edges of partially abated substrates that surround or embeds residual asbestos fibers in an adhesive matrix to prevent their release into the atmosphere.
- 4.16 Enclosure: Procedures necessary to completely enclose material containing asbestos behind airtight, impermeable, permanent barriers.
- 4.17 Engineering Controls: Physical measures which are put into place at the work site to insure containment and control and/or the reduction of asbestos dust and fume exposure.
- 4.18 EPA: United States Environmental Protection Agency.
- 4.19 DNRE: Department of Natural Resources and Environment.
- 4.20 Exposure Monitoring: The personal air monitoring of an employee's breathing zone to determine the amount or level of containment (e.g. asbestos) to which the individual is exposed.
- 4.21 Fiber: A particulate form of asbestos, 5 micrometers or longer, with a length-to width ratio of at least 3 to 1.
- 4.22 Final Clearance Inspection: An inspection by an A.H.E.R.A. trained and DNRE certified Contractor/Supervisor or Certified Industrial Hygienist (CIH) to determine whether abatement and clean up are complete and that units tested pass the final clearance standards as set forth herein. All testing has to be done by an independent NVLAP or AIHA Air Sampling Monitoring accredited environmental laboratory for the purpose of any sampling related

to this asbestos abatement project. The final clearance shall be 0.005 f/cc utilizing NIOSH 7400 method.

- 4.23 HEPA Filter: A High-Efficiency Particulate Air (HEPA) filter capable of trapping and retaining 99.97% of all mono-dispersed particles 0.3 micrometers in diameter or larger.
- 4.24 Manifest: To be originated and signed by the Owner's representatives. The shipping document, EPA form 8700-22, or the DNRE applicable form used for identifying the quantity, composition, origin, routing, and destination of hazardous waste during its transportation from the point of generation to the point of treatment, storage, or disposal.
- 4.25 NESHAP: National Emissions Standard for Hazardous Air Pollutants.
- 4.26 NIOSH: National Institute for Occupational Safety and Health.
- 4.27 Non-friable Asbestos Material: Material that contains asbestos in which the fibers have been locked in by a bonding agent, coating, binder, or other material so that the asbestos is well bound and may not release fibers in excess of the asbestos permissible exposure limit during any appropriate use, handling, storing, transporting, or processing.
- 4.28 OSHA: Occupational Safety and Health Administration.
- 4.29 PEL: Permissible Exposure Limit.
- 4.30 Personal Monitoring: Sampling of asbestos fiber concentrations within the breathing zone of an employee.
- 4.31 Personal Protective Equipment: Equipment may consist of coveralls, shoes, gloves, helmets, goggles, and respirators used for protection against asbestos exposure.
- 4.32 Plastic Sheeting: Fire retardant Polyethylene sheet material of specified thickness used for protection of walls, floors, etc., and critical barriers in the abatement work area.
- 4.33 Regulated Area: A perimeter established to demarcate areas where airborne concentrations of asbestos exceed or can reasonably be expected to exceed the Action Level.

- 4.34 Resource Conservation and Recovery Act (RCRA): The primary federal statute governing waste management from generation to disposal
- 4.35 Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres and approved by NIOSH or MSHA for a specific category of use.
- 4.36 Warning Labels and Signs: As required by OSHA regulations 29 CFR 1910.1001 and 1926.58.

5. ACCESS TO THE WORK AREA

- 5.1 Access to the abatement work area shall be restricted to the contractor's workers and authorized visitors.
- 5.2 Authorized visitors shall have access to the work site at all times following notification to the Owner or its Representative. The contractor shall supply protective clothing and equipment for visitors as necessary, except for respirators which are to be provided by the visitor.
- 5.3 Contractor shall prominently post signs at all potential entry points to the abatement work area which clearly states: "Restricted Area Under Construction Admittance by Special Permission Only - Protective Clothing Required Beyond This Point". Immediately inside the entry point and outside critical barriers post a warning sign meeting specifications of OSHA 29 CFR 1910 and 1926. The suggested format is a sign of minimum size 508 mm by 356 mm displaying the following legend:

=====

DANGER

ASBESTOS

CANCER AND LUNG DISEASE HAZARD

AUTHORIZED PERSONNEL ONLY

RESPIRATORS AND PROTECTIVE CLOTHING ARE
REQUIRED IN THIS AREA

=====

- 5.4 Contractor shall maintain a daily job site personnel log listing names and social security numbers of individuals who entered the abatement work area, and the times of entering and leaving the area.

6. POST REMOVAL

Cleaning and Clearance

- 6.1 Provide general clean-up of the abatement work area concurrent with the removal of all asbestos-containing materials. Do not perform dry dusting or dry sweeping.
- 6.2 Final Air Clearance Testing.
- (a) Final clearance P.C.M. Air Monitoring testing will be performed by the Contractor's Industrial Hygienist. The Final clearance P.C.M. Air Monitoring testing shall be performed by the NVLAP, AIHA, or A2LA accredited Environmental Laboratory for Asbestos Air Monitoring.
- 6.3 Consider abatement work areas and all other decontaminated and cleaned areas clean when:
- (a) All phases of clean-up have been completed and the level of cleanliness is approved.
 - (b) All air samples obtained indicate airborne fiber concentrations of 0.005 f/cc of air or less for final cleaning.

7. AIR MONITORING AND CLEARANCE LEVEL

- 7.1 Analytical Methods: The following methods will be used by the Contractor's industrial hygienist in analyzing filters used to collect air samples.
- 7.1.2 Phase Contrast Microscopy (PCM) - will be performed using the OSHA Reference Method, Appendix A to 29 CFR 1926.1101, or NIOSH Method 7400.
 - 7.1.2 Transmission Electron Microscopy (TEM) - will be performed using the analysis method set forth in the AHERA regulation 40 CFR Part 763 Appendix A, or NIOSH Method 7402, whichever is deemed more appropriate by Owner industrial hygienist in each case.

- 7.2 Before Start of Work: The Contractor's industrial hygienist will secure abatement work area air samples to establish a baseline fiber level in each homogeneous abatement work area before the start of work.
 - 7.3 Daily: From the start of abatement work through project decontamination, the Contractor industrial hygienist laboratory will be taking samples on a daily basis inside and outside each abatement work area.
 - 7.4 All Clearance Air Samples will be collected by the Contractor's Industrial Hygienist Laboratory.
 - 7.5 Abatement Work Area Final Clearance Levels: The Owner standard for abatement work area final clearance for removing the containment and reoccupancy is: less than 0.005 f/cc by PCM or 70 structures per mm² by TEM. All final air samples will meet this criteria.
8. INITIAL ISOLATION OF THE WORK AREA
- 8.1 Contractor shall completely separate the abatement work area from other portions of the building by sealing all openings (windows, doorways, corridor entrances, drains, ducts, grill, diffusers, skylights, etc.) with barriers of 6 mil. polyethylene sheeting and tape, or by sealing cracks leading out of the abatement work area.
 - 8.2 Arrange for the abatement work area to be locked during non-work hours. Install temporary doors with entrance-type locksets that are key-lockable from the outside and always unlocked and operable from the inside.
9. PREPARATION OF ABATEMENT WORK AREA AND TEMPORARY ENCLOSURES
- 9.1 The Contractor shall perform abatement work without damage or contamination of adjacent work areas, buildings, and sites. Where such buildings or work areas are damaged or contaminated, the Contractor shall restore to the original condition at no additional cost to the Owner.
 - 9.2 Clean all contaminated furniture, equipment, and supplies with a HEPA-filtered vacuum cleaner or by wet wiping, prior to being moved or covered.
10. CONSTRUCTION OF WORKER/EQUIPMENT DECONTAMINATION AND WASTE LOAD OUT ENCLOSURES

- 10.1 The Contractor shall construct a worker/equipment decontamination enclosure consisting of at least a clean room, a shower room, and an equipment room, each separated by 36 in. air locks.
 - 10.2 Waste Load-Out Enclosure: Asbestos-contaminated waste that has been containerized shall be transported out of the abatement work area either through the personnel/equipment decontamination enclosure or through a separate waste load-out enclosure.
11. REMOVAL OF ASBESTOS CONTAINING MATERIALS (ACM) - General
- 11.1 The following work shall be done only after the decontamination facilities have been constructed, the area has been isolated and as specified in the previous section, pre-abatement background sampling has been conducted, and arrangements have been made for disposing of waste at an acceptable site.
 - 11.2 Wet Removal: Prior to stripping and/or tooling, the asbestos material shall be sprayed using an airless pump and wetting agents (amended water or removal encapsulant) to enhance penetration and reduce fiber dispersal into the air.
 - 11.2.1 A fine spray of amended water shall be applied to reduce fiber release preceding the removal of the asbestos material. The material shall be sufficiently saturated to prevent the emission of excessive airborne fibers.
 - 11.2.2 Spray material repeatedly during the abatement work process to maintain a continuously wet condition. If a removal encapsulant is used, apply it in strict accordance with the manufacturer's instructions.
 - 11.3 Gross removal of dust and debris from contaminated material, material containers, and equipment shall be accomplished in the containment barrier before removal to the equipment decontamination room for wet sponging before leaving the abatement work site.
12. POST REMOVAL: Cleaning and Clearance
- 12.1 Do not perform dry dusting or dry sweeping.
 - 12.2 Initial Phase Cleanup Sequence

- (a) Remove all visible accumulations of asbestos-containing material and debris.
- (b) Wet clean and HEPA-vacuum all surfaces in the abatement work area.
- (c) Clean all equipment (excluding that which will be needed for further cleaning phases) used in the abatement work area and remove from abatement work area via the Equipment Decontamination Enclosure.
- (d) Remove the top layer (secondary barrier) of plastic sheeting, change all air filtration system pre-filters, and proceed with the second cleaning.
- (e) Replace all HEPA-filters and pre-filters in air filtration air machines with clean filters. Clean all air filtration machines.

12.3 Final Air Clearance Testing.

- (a) Final clearance P.C.M. Air Monitoring testing will be performed by the Contractor's Industrial Hygienist and the amount of clearance samples will be determined by the Owner or its Representatives in compliance with applicable Local, State and Federal regulations. The Final clearance P.C.M. Air Monitoring testing shall be performed by the NVLAP, AIHA or A2LA accredited Environmental Laboratory for Asbestos Air Monitoring.
- (b) After area passes final air clearance dismantle Decontamination Enclosure Systems and thoroughly HEPA-vacuum and wet clean immediate areas.
- (c) Dispose of debris from removal operation, used cleaning materials, unsalvageable materials used for sturdy barriers, and any other remaining materials. Consider the materials to be contaminated, and dispose of accordingly.

12.4 Consider abatement work areas and all other decontaminated and cleaned areas clean when:

- (a) All phases of clean-up have been completed and the level of cleanliness is approved by the Owner or its Representative.

- (b) All air samples obtained indicate airborne fiber concentrations of 0.005 f/cc of air or less for final cleaning.

13. WASTE DISPOSAL

- 7.1 Bulk and containerized asbestos waste shall be packed, labeled, and transported according to DOT Regulations 49 CFR 173.216 and 49 CFR 173.240. All removed ACM, plastic sheeting, tape, cleaning material, clothing, and all other disposable material or items used in the abatement work area shall be packed into double-bagged sealable 6 mil. plastic bags or double containerized with one bag and/or drum. The bags shall be marked with the labels required by OSHA 29 CFR 1910.1001 and/or 1910.1200, and 1926.1101. The Contractor shall transport the approved sealed container and/or drums to an approved waste disposal site.
- 7.2 The Contractor shall remove from the site all other debris and garbage resulting from removal and disposal operations and the temporary construction of containment barriers and enclosures.

****END OF SECTION****

DIVISION 02 – EXISTING CONDITIONS

SECTION 02 83 19 – LEAD-BASED PAINT ABATEMENT

1. INTRODUCTION

- 1.1 The Contractor shall perform all planning, administration, execution, and cleaning necessary to safely perform the abatement of the lead-based paint (LBP) and/or lead-based paint hazards.
- 1.2 The Contractor shall obtain the following permits from the Department of Natural Resources in order to proceed with contract work:
 - 1.2.1 Lead-Based Paint Abatement General Permit
- 1.3 No architectural, engineering or structural demolition work shall be executed before the lead-based paint and components have been removed, stabilized, and/or encapsulated if the materials will be disturbed during such activities.
- 1.4 The Contractor and suppliers are responsible to comply with all the strictest, updated regulations/standards and codes and any changes that may occur during the contracted construction performance period.

2. DESCRIPTION OF THE ABATEMENT WORK

- 2.1 Abatement of lead-based paint and lead-based paint hazards include, but are not necessarily limited to:
 - (a) Notification to regulatory agencies
 - (b) Regulatory permits, licenses, and approvals
 - (c) Worker health and safety program
 - (d) Establishing engineering controls to prevent migration of lead in air from the work area
 - (e) Preparation for abatement operations
 - (f) Personal air monitoring as required by regulatory agencies for the safety of its employees
 - (g) Abatement of existing lead-based paint
 - (h) Transport and disposal of lead-containing or lead-contaminated material
 - (i) Performance of incidental mechanical and electrical work necessary for conducting the Work

- (j) Decontamination and cleaning
- (k) Removal of engineering controls, including teardown of containment and decontamination unit
- (l) Final job close-out

3. PERFORMANCE OF WORK

- 3.1 The Contractor or subcontractor to perform the Work shall be a Lead Hazard Control Contractor licensed to perform lead hazard control work by the Department of Natural Resources and Environment and shall meet the following requirements:
- 3.2 Maintain on site one Superintendent, to remain on site at all times that work is in progress. Superintendent shall be a Competent Person as defined in the Specifications and as required by OSHA.
- 3.3 The Contractor shall comply with the applicable hazardous and non-hazardous waste regulations as specified in Chapter 10 of the Guidelines for Evaluation and Control of Lead Based Paint Hazards in Housing as stated by HUD, as any other material disposal process required by EPA, the Department of Natural Resources approved work plan and the Puerto Rico Solid Waste Administration requirements.
- 3.4 All other work described in the Specifications shall be performed according to applicable codes and standards, federal, state, and local regulations, and the Specifications and Drawings.

4. DEFINITIONS

- 4.1 Abatement: A measure or set of measures designed to permanently eliminate lead-based paint or lead-based paint hazards. Abatement strategies include the removal of lead-based paint, the enclosure or encapsulation of lead-based paint, the removal and replacement of building components coated with leadbased paint, and the removal of lead-contaminated soil or overlaying of soil with a durable covering such as asphalt.
- 4.2 Action Level: The level above which several OSHA requirements is initiated, including, but not limited to: personnel exposure monitoring, medical surveillance, and lead training and education; set by OSHA at 30 micrograms per cubic meter (g/m³).

- 4.3 Air Filtration Unit: A local exhaust unit, utilizing HEPA filtration and capable of maintaining a minimum negative pressure differential of 0.5 mm of water gauge pressure within the containment with respect to that of the surrounding areas.
- 4.4 Air Monitoring: The process of measuring the airborne lead content of a specific volume of air during a stated period of time.
- 4.5 Airborne Lead Dust Contamination: Any interior condition following abatement in which an appropriate air monitoring test indicates eight-hour time weighted average of greater than 15 micrograms of lead per cubic meter (15 ug/m³) of air.
- 4.6 Chewable Surface: All chewable protruding painted surfaces up to five feet from the floor or ground, which are readily accessible to children under seven years of age i.e., protruding corners, windows sills and frames, doors and frames, linen and pantry closet shelves, kitchen wall, base cabinets and other protruding painted surfaces.
- 4.7 Clean Room: An uncontaminated area or room which is part of the decontamination unit, with provisions for storage of worker's or authorized visitor's street clothing and protective equipment, and other uncontaminated materials and equipment.
- 4.8 Clearance Standards for Original Bare Soil and Floors: The following is the standard by which lead content for the original bare soil clearance shall be below in order to be accepted for the abatement are reutilization:
- Original Bare Soil - 400 ug/g, floor dust wipes - 40 ug/ft², window sill 250 ug/ft². (These are the Puerto Rico lead standards as specified in the DNR's Lead Based Paint Abatement Activities Control Regulation clearance level after the demolition/abatement is finished and accepted by the OWNER and its representatives.
- 4.9 Competent Person: An agent of the Contractor (i.e., the on-site Superintendent) who is a Competent Person as defined by OSHA regulations. This person must be capable of identifying existing and predictable lead hazards and have the authorization by the Contractor to take prompt corrective actions to eliminate them. The Competent Person shall remain on site at all times during the Work.
- 4.10 Containment: A temporary enclosure constructed with 6 mil thick plastic sheeting, suitable framing, and duct tape and other adhesives within the work area. The containment serves to confine the lead-based paint

abatement, and decontamination work, and to contain the release of airborne lead dust and debris through the action of pressure differential ventilation and air filtration units when required by these Specifications.

- 4.11 Critical Barrier: Those portions of the containment which represent the minimum structural components necessary to maintain the work area in airtight isolation from the surrounding areas.
- 4.12 Decontamination Unit: A series of connected rooms with curtained doorways between each room, for the decontamination of the abatement workers, equipment and materials. The system is constructed of an airtight, impermeable, temporary barrier.
- 4.13 SHPO: State Historic Preservation Office.
- 4.14 Elevated Blood Lead Level (EBL): Excessive absorption of lead (Pb), which is a confirmed concentration of lead (Pb) in whole blood as determined by the whole blood lead (Pb) method, utilizing Vena-Puncture technique.
- 4.15 Encapsulation: Any covering or coating (encapsulant) that acts as a barrier between existing lead-based paint and the environment, the durability of which relies on adhesion and the integrity of the existing bonds between multiple layers of paint, and between the paint and the substrate.
- 4.16 Enclosure: The use of rigid, durable construction materials that are mechanically fastened to the substrate to act as a dust-tight, impermeable, permanent barrier between the lead-based paint and the environment.
- 4.17 Engineering Controls: Measures which are put into place at the work site to insure containment and control and/or the reduction of lead dust debris and fume exposure.
- 4.18 EPA: The United States Environmental Protection Agency.
- 4.19 EPA Identification Number: A number which is assigned specifically to a generator or transporter of hazardous waste.
- 4.20 DNRE: Puerto Rico Department of Natural Resources and Environmental.
- 4.21 Exposure Monitoring: The personal air monitoring of an employee's breathing zone to determine the amount of level of containment (e.g.

lead) to which the individual is exposed. Monitoring is required for all employees directly involved with this LBP demolition abatement operation. All testing (before, during and final worker's monitoring) shall be executed by an independent ELPAT audited, AIHA or A2LA accredited environmental laboratory for lead air monitoring.

4.22 Final Clearance Inspection: An inspection by an DNRE Certified Lead Based Paint model trained Inspector or Risk Assessor with proven experience, to determine whether abatement and clean-up are complete and that all units tested pass the final clearance standards as set forth herein will performed the final clearance inspection.

4.23 Generator: Any person (s), by site, whose act or process produces hazardous waste identified or listed in 40 CFR 261 or whose act first caused a hazardous waste to become subject to regulation.

4.23.1 Conditionally Exempt Small Generator: A generator producing no more than 100 kilograms (220 pounds) of hazardous waste per month and has received a written exemption from EPA. Conditionally exempt generators are required only to dispose of their wasted is compliance with the DNRE regulations, which, in most States, means that they must label their and take it to a licensed solid waste disposal facility. However, some States require disposal of even small quantities of hazardous waste at a licensed hazardous waste disposal facility.

4.24 Small Generator: A generator producing more than 100 kilograms but less than 1000 kilograms per month. A small generator must comply with EPA and DNRE hazardous waste regulations for accumulation, treatment, storage, and disposal of hazardous waste.

4.24.1 Large Generator: A generator producing 1000 kilograms or more of hazardous waste per month. Large generator must comply with all EPA and DNRE hazardous waste regulations, including reporting and record keeping.

4.25 Hazardous Waste: As defined in EPA regulations, hazardous waste is solid waste or a combination of solid wastes that because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause or significantly contribute to increases in mortality, serious and irreversible or incapacitating but reversible illness, or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed. Lead-based hazardous waste is waste that contains greater than or equal to 5 parts

per million (ppm) of leachable lead as determined by the toxicity characteristic leaching procedure (TCLP) test, or is waste that is corrosive, ignitable, or reactive and not otherwise excluded.

- 4.26 HEPA Filter: A High Efficiency Particulate Air filters capable of trapping and retaining 99.97 percent of all mono-dispersed particles 0.3 micrometer in diameter or larger.
- 4.27 HUD: The United States Department of Housing and Urban Develop.
- 4.28 Impermeable Waste Disposal Containers: Containers suitable to receive and retain any lead-containing or lead-contaminated material until disposal at an EPA-approved site. The containers shall be labeled in accordance with all applicable regulations and as directed in these Specifications.
- 4.29 Interim Lead-Based Paint Controls: A set of measures designed to temporarily reduce human exposure or possible exposure to lead-based paint hazards. Interim controls include paint film stabilization, encapsulation of lead-based paint, friction and impact surface treatment, dust removal and control, and interim controls of lead-contaminated soil.
- 4.30 Lead-Based Paint (LBP): Any paint, varnish, shellac, or other coating that contains lead equal to or greater than 0.5 percent by weight as measured by laboratory analysis, or 1.0 milligrams per square centimeter (mg/cm²) as measured by XRF or laboratory analysis.
- 4.31 Lead-Based Paint Hazard: A condition in which exposure to lead from lead contaminated dust, lead-contaminated soil, or deteriorated lead-based paint would have an adverse effect on human health.
- 4.32 Manifest: The shipping document, EPA form 8700-22, or the DNRE applicable form used for identifying the quantity, composition, origin, routing, and destination of hazardous waste during its transportation from the point of generation to the point of treatment, storage, or disposal.
- 4.33 Microgram (µg): The prefix “micro” means one millionth of (1/1,000,000 of). A microgram is one millionth of a gram.
- 4.34 NIOSH: National Institute for Occupational Safety and Health.

- 4.35 Off-Site Paint Removal: The process of removing a component from a building and stripping the lead-based paint from the component at an off-site paint-stripping facility.
- 4.36 OSHA: Occupational Safety and Health Administration.
- 4.37 Permissible Exposure Limit (PEL): The level above which special precautions and procedures must be implemented for the protection of personnel within the work area; set by OSHA at 50 $\mu\text{g}/\text{m}^3$.
- 4.38 Personal Monitoring: Sampling of the airborne lead concentrations within an employee's breathing zone, to determine the eight hour time-weighted average (TWA).
- 4.39 Personal Protective Equipment: Equipment for protecting the eyes, face, head, and extremities. Personal protective equipment includes protective clothing, respiratory devices, and protective shields, and is used when hazards capable of causing bodily injury or impairment are encountered.
- 4.40 Regulated Area: An area established to demarcate areas where airborne concentrations of lead exceed or can reasonably be expected to exceed the Action Level.
- 4.41 Removal and Replacement: An abatement method that entails the removal of building components coated with lead-based paint (e.g., windows, doors, trim, etc.) and the installation of components free of lead-based paint.
- 4.42 Resource Conservation and Recovery Act (RCRA): The primary federal statute governing waste management from generation to disposal. RCRA defines the criteria for hazardous and non-hazardous waste.
- 4.43 Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres and approved by NIOSH or MSHA for a specific category of use.
- 4.44 Substrate: A surface on which paint, varnish, or other coating has been applied or may be applied. Examples of substrates include wood, plaster, metal, drywall, brick and block, stone, and concrete.
- 4.45 Toxicity Characteristic Leaching Procedure (TCLP): A laboratory test used to determine if excessive concentrations of lead or other hazardous

materials could leach from a sample into groundwater; usually used to determine if waste is hazardous based on its toxicity characteristics.

- 4.46 Wet Cleaning: The process of eliminating loose contamination from building surfaces and objects by using cloths, mops, or other cleaning tools. These cleaning tools shall be disposed of as lead-contaminated waste.
- 4.47 Windowsill: The portion of the horizontal window ledge, adjacent to the window sash when the window is closed, that protrudes into the interior or the room or from the exterior of the window; sometimes called the 'window stool'.
- 4.48 Window Trough: For a typical double-hung window, the portion of the exterior windowsill between the interior window sill and the frame of the storm window. If there is no storm window, the window trough is the area that receives both the upper and lower window sashes when they are both lowered; sometimes called the 'window well'.
- 4.49 XRF Analyzer: An instrument that determines lead concentration in milligrams per square centimeter using the principle of x-ray fluorescence (XRF).

5. ACCESS TO WORK AREA

- 5.1 Access to the work area shall be restricted to the Contractor's workers and authorized visitors.
- 5.2 Authorized visitors shall have access to the work site at all times, following notification to the Owner or its Representative. The Contractor shall supply protective clothing and equipment for authorized visitors, as necessary, except for respirators, which shall be provided by the authorized visitor.
- 5.3 Signage for Abatement Work: The Contractor shall prominently post signs at all entry points to the work area which clearly warns that lead abatement work is being conducted in the vicinity in Spanish and English languages. Immediately inside the entry point and outside critical barriers post a warning sign meeting specification of OSHA. The format shall be a sign of minimum size 500 mm by 350 mm displaying the following legend:

WARNING
LEAD WORK AREA
POISON
UNAUTHORIZED ENTRY PROHIBITED
NO SMOKING, EATING OR DRINKING PERMITTED IN THIS AREA

Signs shall be in bold lettering a minimum of 50 mm tall.

- 5.3.1 All workers and authorized visitors shall enter the work area through the decontamination unit only, in accordance with these Specifications.
- 5.3.2 All workers and authorized visitors, before entering the work area, shall read and be familiar with all posted regulations, personal protection requirements, and emergency procedures and exit routes.
- 5.3.3 The Contractor shall maintain a daily job site personnel log listing names and social security numbers of individuals who entered the work area, and the times of entering and leaving the work area.

6. LEAD MONITORING, TESTING, AND ANALYSIS PROCEDURES

- 6.1 Laboratories used to conduct lead analyses shall participate in the EPA's National Lead Laboratory Accreditation Program (NLLAP).
- 6.2 Sampling for lead-in-paint shall be performed by persons licensed by the DNRE to perform lead-based paint inspections/risk assessments. Sampling shall be performed generally following the protocols included in HUD's *"Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing"* using either an XRF Lead Paint Analyzer or by bulk paint chip sampling. Analysis of bulk paint chips for lead shall be performed by an accredited laboratory using either Flame Atomic Absorption Spectroscopy (FLAA) or by Inductively Coupled Plasma (ICP).
- 6.3 Sampling for lead-in-air shall be performed generally following the *"Sampling Airborne Particulate for Lead (NIOSH Method 7082)"* procedure as outlined in HUD's *"Guidelines for the Evaluation and*

Control of LeadBased Paint Hazards in Housing". Analysis of lead-in-air samples shall be performed by an accredited laboratory using either FLAA or ICP methods.

- 6.4 Lead dust wipe sampling shall be performed generally following the *"Wipe Sampling for Settled Lead-Contaminated Dust"* procedure as outlined in HUD's *"Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing"*. Analysis of lead wipe samples shall be performed by an accredited laboratory using FLAA following NIOSH Modified Method 7082 or by ICP following Modified OSHA Method ID-125.
- 6.5 Lead-in-soil sampling shall be performed generally following the procedures outlined in HUD's *"Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing"*. Analysis of soil for lead shall be performed by an accredited laboratory by FLAA or ICP.
- 6.6 Bulk samples of waste for TCLP analysis shall be representative samples of the waste and shall be collected following the procedure indicated by the selected laboratory performing the TCLP analysis. TCLP analysis of representative samples of lead-containing or lead-contaminated waste shall be performed by an accredited laboratory following EPA Method SW-846 *"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"*.

7. INITIAL ISOLATION OF WORK AREA

- 7.1 The Contractor shall coordinate the sequence of work area preparation throughout the building with the Owner or its Representative and other trades to properly segregate work areas from areas that must remain fully or partially operational or in which other construction is being performed.
- 7.2 Doorways and corridors which will not be used for passage during work shall be sealed with 13 mm thick fire retardant plywood, fire retardant wood framing, and poly sheeting with tape.
- 7.3 The Contractor shall arrange for the work area to be locked during non-work hours. Install temporary doors with entrance-type lock sets that are key lockable from the outside and always unlocked and operable from the inside. Remove deadbolts and padlocks. Provide one key to be held by the Owner or its Representative in the Inspection Office.

8. PREPARATION OF WORK AREA: ABATEMENT - INTERIOR

- 8.1 The Contractor shall clean and remove items required for access; clean all furniture, equipment, and supplies in the work area with a HEPA-filtered vacuum or by wet wiping, as directed by the Owner or its Representative, prior to being moved or covered.
- 8.2 The Contractor shall remove all removable furniture, equipment, and supplies that have been deemed by Owner or its Representative to be uncontaminated, or shall completely seal with two layers of 6 mils poly sheeting and duct tape.
- 8.3 The Contractor shall cover the floor of the work area with two layers of 6 mil poly sheeting turned up at the walls at least 600 mm.
- 8.4 The Contractor shall cover all walls in the work area, including sealed critical barriers, with two layers of 6 mil poly sheeting, sealed with duct tape or spray glue.

9. CONSTRUCTION OF WORKER/EQUIPMENT DECONTAMINATION AND WASTE LOAD UNIT

- 9.1 The Contractor shall construct a three-stage worker/equipment decontamination unit at each location where workers and equipment will enter or exit the work area.
- 9.2 Decontamination units shall consist of a Clean Room, a Wash Area (with shower facilities when required by these Specifications), and an Equipment Room, each separated by 1.0 meter air locks (narrower air locks may be built if approved by the Owner or its Representative).

10. PREPARATION OF WORK AREA: ABATEMENT - EXTERIOR

- 10.1 Exterior lead-based paint abatement work shall not be conducted if wind speeds or gusts are equal to or greater than 30 km/hr; work must stop and cleanup shall be completed before precipitation begins; work shall not begin if precipitation has been forecast to occur during the work shift.
- 10.2 The Contractor shall post warning signs on the building exterior and along temporary fencing or tape barrier.

- 10.3 The Contractor shall clean all surfaces in the work area with a HEPA-filtered vacuum or by wet wiping, as directed by the Owner or its Representative.
- 10.4 The Contractor shall install a minimum of two layers of 6 mils poly sheeting on all critical barriers in the work area to the building interior (e.g., windows, doors, air intake grills, window air conditioning units, etc.).
- 10.5 The Contractor shall cover the floor surface of the work area with two layers of 6 mil poly sheeting, turned up at any walls at least 600 mm.

11. PROHIBITED ABATEMENT METHODS

- 11.1 Open Flame Burning or Torching
- 11.2 Heat Guns Operating Above 590 °C
- 11.3 Machine Sanding or Grinding Without a HEPA Exhaust Tool
- 11.4 Uncontained Hydroblasting or High-Pressure Water Wash
- 11.5 Abrasive Blasting or Sandblasting
- 11.6 Chemical Paint Removal Using Methylene Chloride-Based Paint Strippers
- 11.7 Dry Scraping:

12. ACCEPTABLE ABATEMENT METHODS AND PROCEDURES

- 12.1 Building Component Removal and Replacement
- 12.2 Paint Removal - Mechanical Methods
- 12.3 Heat Guns
- 12.4 HEPA Vacuum Needle Gun
- 12.5 HEPA Vacuum Blasting
- 12.6 Component Demolition

12.7 Machine HEPA Sanding

12.8 Wet Sanding

12.9 Paint Removal - Chemical Methods

12.10 Soil Abatement:

13. LEAD BASED PAINT ENCAPSULATION

13.1 Preparation of Surfaces - General surface preparation instructions for all substrates: All surfaces to be encapsulated should be properly prepared so that all are clean, dry, sound, and deglossed at the time of application.

- (a) Wash all areas to be encapsulated with manufacturer-approved lead-specific surface cleaner. Clean to the extent required to remove existing deteriorated coatings and any other foreign matter, paying particular attention to areas found under structural components such as eaves, beams, archways, etc.
- (b) If necessary, oil, grease and similar surface contamination should be removed with any manufacturer-approved degreasing surface cleaner which is free-rinsing and does not require a neutralizer.
- (c) Rinse surfaces with clean water. Avoid uncontrolled release of rinsate beyond the work area, as it may contain lead. Jurisdictional regulations for the management of rinsate (collection and disposal of waste liquids) can vary, and project-specific requirements are the responsibility of the installer.
- (d) On representative surfaces, perform a "water-break" test to determine if traces of oil, grease, and similar hydrophobic contaminants are still present.
- (e) Surfaces contaminated with mold, mildew, and/or other contaminant microorganisms (e.g., biofilms) should be examined carefully for sources of excess moisture and water-damage and thoroughly cleaned.
- (f) If cleaned and dry surfaces continue to exhibit loose particulate residues, such as chalking, and dusting, attempt to remove post-cleaning residues with a HEPA vacuum.

(g) Surface Drying After Cleaning:

- a. Allow the surface to dry before applying an encapsulant.
- b. The extent of drying after cleaning may be product specific, and the manufacturer will make specific guidance available

13.2 Application

13.2.1 Apply encapsulant only after the surface has been examined, assessed, prepared, cleaned, primed, and dried, as outlined in the surface assessment and preparation sections of this specification. Application of encapsulant to surfaces that are not clean, dry, sound, deglossed and properly primed as described will void all warranties.

13.2.2 Apply encapsulant at a wet mil film thickness that will yield the recommended minimum dry mil film thickness at which the submitted testing to ASTM E 1795-20a documents compliance with performance requirements mandated in regulations.

13.2.3 Wet mil film thickness should be measured throughout any encapsulation project using a wet mil gauge.

13.3 Methods of Application

13.3.1 Airless Spray: Encapsulants can be successfully applied with most major brands of airless spray equipment.

13.3.2 Roller: For best results apply with a 3/8" - 1/2" nap roller (manufacturer recommendations may vary).

13.3.3 Brush: Apply liberally and uniformly with a polyester or nylon brush.

14. CLEARANCE PROCEDURES

14.1 Visual Inspection:

14.1.1 All surfaces from which paint has been removed and/or encapsulated will be visually examined by the Architect. The Architect will examine the bare surfaces to ensure that there is no visible residue. If residue remains, the Contractor shall re-clean the component prior to repeating the visual inspection.

- 14.1.2 If a building component has been removed and replaced, the Architect will examine the work area to ensure that each building component specified for removal and replacement has been completely removed.
- 14.1.3 If a lead-based paint enclosure system has been installed, the Architect will examine the mechanical fastening system used to hold the enclosure to the substrate to determine that the fastening system is adequate. All seams and edges in the enclosure will be examined to ensure that they are sealed to provide a dust tight system.
- 14.1.4 If a lead-contaminated soil abatement has been performed, the Architect will examine the work area to ensure that no visible lead-based paint chips are present in the soil following the Work. The Architect will examine all soil areas selected for abatement to document that each has been completely treated, or removed, as specified.
- 14.1.5 There shall be no evidence of settled dust following the Contractor's cleanup effort. Any settled dust present in the work area during the visual inspection provides sufficient evidence that the Contractor's cleanup effort was not adequate. The area immediately outside the containment will also be visually examined to confirm that no leaded dust or paint chips have been transferred outside the work area.

14.2 Lead Wipe Sampling:

- 14.2.1 Final Lead dust wipe clearance sampling will be performed by the Contractors Industrial Hygienist following the *"Wipe Sampling for Settled Lead-Contaminated Dust"* procedure as outlined in HUD's *"Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing"*. Analysis of lead wipe samples shall be performed by an accredited laboratory using FLAA following NIOSH Modified Method 7082 or by ICP following Modified OSHA Method ID-125.
- 14.2.2 Decontamination shall be considered complete when every lead dust wipe sample is at or below the following levels (given in micrograms of lead per square foot):

Surface	Leaded Dust Loading (\squareg/ft²)
Bare Floors	10
Interior Window Sills	100
Window Troughs	800
Exterior Concrete or Rough Other Surfaces	800

14.2.3 The Contractor shall re-clean those areas which do not comply with the specified final clearance levels. Following re-cleaning efforts, visual inspection and clearance sampling shall be performed to ensure that the re-cleaning was effective. The Contractor is responsible for the cost incurred during re-cleaning activities and all clearance sampling costs.

14.2 Lead Soil Sampling:

14.2.1 Lead-in-soil sampling shall be performed generally Following an exterior lead-based paint abatement the Contractors Industrial Hygienist will collect a minimum composite soil samples following the procedures outlined in HUD's *"Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing"*. Analysis of soil for lead shall be performed by an accredited laboratory by FLAA or ICP.

14.2.2 Decontamination shall be considered complete when each composite lead soil sample is at or below the following levels (given in micrograms of lead per gram of soil):

Soil Area	Lead in Soil Level (\squareg/g)
High-Contact Public Areas	400
Child Care Play Areas	400
Other Soil Areas	1,200

14.2.3 If lead in soil levels are greater than or equal to the applicable limits, additional soil treatment may be required.

15. WASTE MANAGEMENT

15.1 General: The Contractor shall properly store and secure all waste at all times. Do not leave debris in the work area or in uncovered or unlocked trucks or dumpsters. Do not leave any waste in unsecured areas accessible to the public. Do not incinerate debris or use any unauthorized dumpster. Do not introduce lead-contaminated water into storm or sanitary sewers. Do not permit recycling of building components coated with lead-based paint.

15.2 Waste Management:

15.2.1 If the waste characterization of the samples sent for 8 RCRA TCLP resulted below the regulatory limit of 5 mg/L for lead; the waste generated during the lead-based paint abatement shall be removed and categorized as Non-Hazardous Special Waste for lead. If the results exceed the regulatory limit it shall be disposed as Hazardous Waste.

15.2.2 If required to perform additional 8 RCRA TCLP analysis the Contractor shall segregate abatement waste into distinct waste streams (e.g., disposable suits, lead-contaminated polyethylene sheeting, lead-contaminated wastewater, hazardous chemical sludge, etc.). Various combinations of each in different containers will not be accepted.

15.2.3 Lead-containing or lead-contaminated waste shall be considered as hazardous waste, and labeled in accordance with this specification, unless:

- i. lead leachate concentrations of the waste are determined to be less than 5 ppm from representative bulk samples, by TCLP analysis.
- ii. The waste does not meet any other regulatory definitions as "hazardous waste".

15.2.4 Waste tested which results in a lead leachate concentration of greater than or equal to 5 parts per million shall be

considered hazardous and shall be handled and disposed of as such according to local, state, and federal regulations.

15.2.5 The Contractor shall not accumulate hazardous waste on site for longer than 90 days.

15.3 Hazardous and non-hazardous waste shall be disposed according to all federal, state, and local regulations.

****END OF SECTION****

SECTION 03 53 00

POLISHED CONCRETE FLOOR TOPPINGS

Fast-Setting, High Strength, Cementitious, Non-Shrink, Polishable Architectural Topping & Resurfacer

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Supply and installation of a fast-setting, high strength, cementitious, non-shrink, polishable architectural topping & resurfacer for interior and exterior flooring installations.

1.2 REFERENCES

- A. ASTM C109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars
- B. ASTM C 309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
- C. ASTM C348 Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars
- D. ASTM C 779 Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces
- E. ASTM C1028 Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer PullMeter Method
- F. ASTM C 1315 Liquid Membrane-Forming Compounds Having Special Properties of Curing and Sealing Concrete
- G. ASTM E430 Standard Test Method for Measurement of Gloss of High-Gloss Surfaces by Abridged Goniophotometry
- H. ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
- I. ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
- J. ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
- K. ACI 302.1R-04 Guide for Concrete Floor and Slab Construction

1.3 SUBMITTALS

- A. General: Submit samples and manufacturer's product data sheets, installation instructions, maintenance procedures, project references, etc. in accordance with Division 01 General Requirements Submittal Section.
- B. Test Data: Submit qualified testing data that confirms compliance with specified performance requirements.
- C. Maintenance Data: For inclusion in maintenance manual required by Division 01.
 - a. Include manufacturer's instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under intended use.
 - b. Include precautions against cleaning products and methods which may be detrimental to finishes and performance.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer:
 - a. Must have marketed fast-setting, high strength, cementitious, polishable materials in the United States for at least five years and must have completed projects of the same general scope and complexity.

- b. Overlay and complementary materials must be manufactured by or approved for use by CTS Cement Manufacturing Corp. (800-929-3030, www.CTScement.com) and distributed by the same or an authorized CTS Cement dealer.
- 2. Applicator:
 - a. Must be experienced and competent in installation of fast-setting, high strength, cementitious, polishable materials and provide evidence of a minimum of five years experience in work similar in size and scope to that required by this section.
 - b. Must retain sufficient production capability, facilities, and personnel to produce specified work.
 - c. Must provide proof of current placement on the CTS Preferred Applicator List. Temporary listings must be approved in writing by an authorized CTS Cement Manufacturing Technical Representative at least 15 days prior to installation and are required to have an authorized CTS Representative on site for initial application.
- B. Samples:
 - 1. Submit samples for approval. Samples must be of materials specified and of suitable size as required to accurately represent each color and texture used on project. Prepare each sample using the same tools and techniques for actual project application.
 - 2. Maintain and make approved samples available at the job site throughout the construction process and until final acceptance.
 - 3. Mock-Up: Provide a mock-up of the complete system sample panel, sized according to drawings, using workmen, equipment, and techniques proposed for use on the project.
 - a. Mock-up must be reviewed for uniformity of depth and thickness, finish color and texture, and overall quality of construction.
 - b. The approved panel will become the standard of comparison for finished work for the project.
 - c. The approved panel must remain on site throughout the construction process and until final acceptance.
 - d. Approved mock-up may become part of the completed work if undisturbed at time of substantial completion.
 - e. Upon project completion and final acceptance, dispose of the sample in accordance with local construction waste guidelines.
- C. Walkway Auditor:
 - 1. Certified by CPAA or NFSI to test polished concrete floors for dynamic and static coefficient of friction according to ANSI B101.1 and B101.3.
- D. Coefficient of Friction:
 - 1. Achieve following coefficient of friction by field quality control testing in accordance to the following standards:
 - a) ANSI B101.1 Static Coefficient of Friction - Achieve a minimum of [.5] for level floor surfaces.
 - b) ANSI B101.3 Dynamic Coefficient of Friction - Achieve a minimum of [.35] for level floor surfaces.

1.5 PRE-INSTALLATION MEEETINGS

- A. Organize meeting to review specification requirements and finished aesthetics. Require representatives of each entity directly concerned to attend, including the following:
 - [1. Owner.
 - [2. Architect.
 - [3. Contractor's Superintendent/Supervisor.
 - [4. Overlay & Polishing Subcontractor(s), including Finishers and Supervisor.
 - [5. Complementary Hardeners, Sealers, Colorants Manufacturer(s).

[6. Overlay Manufacturer's Representative.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver products in original, unopened, undamaged packaging with manufacturer's identification (i.e., brand logo, product name, weight of packaged unit, lot number). Maintain records of manufacturer's product lot numbers.
- B. Storage: Store products in a dry location, covered, out of direct sunlight, off the ground, and protected from moisture. Maintain storage temperature required by the manufacturer. Keep materials dry until used. Store bulk sand in a well-drained area on a clean, solid surface. Cover sand to prevent contamination. Protect materials from temperature extremes.
- C. Handling: Handle products in accordance with manufacturer's published recommendations.

1.7 SITE / ENVIRONMENTAL CONDITIONS

- A. Temperature: Maintain ambient and surface temperatures between 50°F (10°C) and 90°F (32°C). Do not apply materials if ambient temperature falls below 50°F (10°C) within 24 hours of application. Protect materials from uneven and excessive evaporation during dry weather, windy conditions and strong blasts of dry air.
- B. Inclement Weather: Do not apply materials during inclement weather unless appropriate protection is employed.
- C. Sunlight Exposure: Avoid, whenever possible, installation of materials in direct sunlight which could adversely affect aesthetics.
- D. Substrate: Prior to installation, the substrates must be inspected for surface contamination or other conditions that may adversely affect the performance of the materials and be free of residual moisture.
- E. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation and other conditions affecting product performance.
- F. Damage and Stain Prevention: Take precautions to prevent damage and staining of substrates and surfaces to be polished before and after installation.
 - 1. Protect areas to receive polished topping at all times to prevent oils, dirt, metal, excessive water and other potentially damaging materials from affecting the finished surface.
 - 2. Prohibit use of markers, spray paint, and soapstone.
 - 3. Prohibit vehicle traffic over surfaces. If necessary to complete a scope of work, drop cloths or other suitable materials must be placed under vehicles at all times.
 - 4. Prevent staining by hydraulic-powered equipment fluids.
 - 5. Prohibit steel from being placed on the finished surface to avoid rusting.
 - 6. Prohibit pipe-cutting operations over surfaces.
 - 7. Prohibit ferrous metals storage over surfaces.
 - 8. Protect from petroleum, oil, hydraulic fluid, or other liquid dripping from equipment working over surfaces.
 - 9. Protect from acids and acidic detergents contacting substrates and surfaces to be polished.
 - 10. Protect from painting activities.
 - 11. All trades must be informed that the surfaces must be protected at all times.

12. Installed topping area must be closed to traffic during finish floor application and after application for the length of time recommended by the manufacturer.

1.8 COORDINATION AND SCHEDULING

- A. Coordinate installation of materials with all other trades to avoid impeding other construction.
- B. Sufficient manpower must be provided to ensure continuous application and timely finishing.

PART 2 - PRODUCTS

2.1 MANUFACTURERS (As mentioned in the Drawing Set, G.C. may use an equivalent product as long as it is submitted for Architect approval.)

- A. Basis of Design: CTS Cement Manufacturing Corp., 12442 Knott Street, Garden Grove, CA 92841 (800-929-3030, www.CTScement.com).
- B. Components: Obtain overlay and complementary materials manufactured by CTS Cement from authorized distributors. No substitutions or additions of other materials are permitted without prior written permission from the manufacturer for this project.

2.2 MATERIALS

- A. Fast Setting, High Strength, Cementitious Polishable Overlay
 - [1. Rapid Set® TRU [Natural or Gray]: a pre-packaged, high-performance, fast-setting, selfleveling cementitious, polishable overlay material mixed with water on site. Suitable for use interior and exterior, in wet and dry conditions, for flooring applications where high durability, rapid strength gain and polished aesthetics are desired. Ideal for fast-track projects Ready for foot traffic in 2 to 3 hours; coatings in 12 hours; grind and polish in 24 hours.
- B. Primer
 - [1. Rapid Set® TXP™ FAST: a high-performance, 100% solids, no VOC, fast-curing, moisture tolerant, interior epoxy primer designed for use with cementitious overlays. Provides high bond strength to ensure strong adhesion. Acceptable MVER ≤ 10 lbs/1000 sq. ft. per 24 hr. and RH ≤100%. Ready for overlay in 4-6 hours.
- C. Additives and admixture materials must be approved for use by CTS Cement Manufacturing Corp. prior to use. (800-929-3030, www.CTScement.com)
- D. Water: Clean, potable water free of deleterious amounts of silt and dissolved salts.

2.3 MATERIAL PERFORMANCE

- A. Fast Setting, High Strength, Non-Shrink Cementitious Polishable Overlay
 - 1. Minimum performance requirements:

Compressive Strength (ASTM C109 Modified*)	4 hours 24 hours 28 days	3,000 psi 5,000 psi 6,500 psi
Tensile Strength (ASTM C307 Modified*)	7 Days 28 Days	210 psi, minimum 365 psi, minimum

**Data obtained at 70°F (21°C)*

- B. Finished Sheen/Gloss Level

1. Polished Concrete Level 1 – Low Gloss: At a distance of 100 feet, the floor will reflect images from side lighting and achieve gloss meter readings of 30 to 40.
- [1. Polished Concrete Level 2 – Medium Gloss: At a distance of 30 to 50 feet, the floor will clearly reflect from side and overhead lighting and achieve gloss meter readings of 41 to 55.
- [1. Polished Concrete Level 3 – High Gloss: Looking straight down, the floor will clearly reflect overhead and side light, with the appearance of the floor looking wet and achieve gloss meter readings of 56 or higher.

2.4 AGGREGATES

- A. Fine and coarse aggregates must conform to ASTM C33/C33M.
- B. Lightweight aggregates must conform to ASTM C330/C330M.
- C. Provide aggregates from a single source with a documented satisfactory service record for at least 10 years in similar applications and service conditions using similar aggregates and cementitious materials.

2.5 RELATED MATERIALS

- A. Repair Materials: Products designed to repair cracks and surface imperfections prior to application of overlay material. Product is to be approved by architect prior to commencing work.
 1. Rapid Set LevelFlor®: a quick setting, hydraulic cement-based, self-leveling floor underlayment suitable for use both indoors and outdoors to produce a flat, strong surface. Applied at 0.25 to 2.0" depth neat, up to 5" extended.
 2. Rapid Set Cement All®: a pre-packaged, high-performance, fast-setting, multi-purpose, nonmetallic, cementitious, non-shrink grout and concrete repair material mixed with water on site. Suitable for use in wet environments and any application where high durability and rapid strength gain are desired. Structural strength is achieved in one (1) hour. Suitable for structural and non-structural applications. Applied at 0 to 4" depth.
 3. Rapid Set® Mortar Mix: a pre-packaged, trowel grade, high-performance, fast-setting, multipurpose, non-metallic, cementitious repair material [with integral air entrainment] mixed with water on site. Suitable for indoor and outdoor use, use in wet environments, and for any application where high durability, rapid strength gain and low shrinkage are desired. Structural strength is achieved in one (1) hour. Suitable for structural and non-structural applications from 1/2 in. to 6 in. depths.
 4. Rapid Set® Concrete Mix: a pre-packaged, trowel grade, high-performance, fast-setting, multi-purpose, non-metallic, cementitious repair material [with integral air entrainment] mixed with water on site. Suitable for indoor and outdoor use, use in wet environments, and for any application where high durability, rapid strength gain and low shrinkage are desired. Structural strength is achieved in one (1) hour. Suitable for structural and non-structural applications from 2 in. to 24 in. depths.
 5. Metzger/McGuire Rapid Refloor: a 100% solids, two-component, low viscosity structural polyurea/polyurethane hybrid intended for use in repairing cracks and small surface defects such as bolt holes and pop-outs in industrial, retail or commercial concrete floors.
- B. Liquid Densifier: An aqueous solution of Silicon Dioxide dissolved in one of the following Hydroxides that penetrates into the concrete surface and reacts with the Calcium Hydroxide to provide a permanent chemical reaction that hardens and densifies the wear surface of the cementitious portion of the concrete. All of the following have the same chemistry varying only by the alkali used for solubility of the Silicon Dioxide.
 1. Sodium Silicate
 2. Potassium Silicate
 3. Lithium Silicate
 4. Alkalis solution of Colloidal Silicates or Silica

- C. Admixtures: Must conform to ASTM C494. All additives and admixture materials must be approved for use by CTS Cement Manufacturing Corp. prior to use. (800-929-3030, www.CTScement.com)
- D. Sand: Washed and kiln dried angular cut #20 - #30 grit silica sand for use with primer.
- E. Installation Accessories: Gauge rakes, spreaders, or rollers for overlay placement. Use the Rapid Set® TRU® Spiked Roller to remove entrapped air.

2.5 PIGMENTS/COLORANTS

- A. Must comply with ASTM C979/C979M, synthetic mineral-oxide pigments or colored water reducing admixtures and be color stable, [free of carbon black,] nonfading, and resistant to lime and other alkalis.

2.6 JOINT AND CRACK FILL MATERIALS

- A. Saw Cut Contraction/Construction Joint Filler and Crack Filler
 - 1. Metzger/McGuire MM-80□/MM-80P Semi-Rigid Polyurea Joint Filler.
 - 2. Metzger/McGuire Rapid Refloor.

2.7 POLISHING EQUIPMENT

- A. Field Grinding and Polishing Equipment:
 - 1. A multiple-head, counter-rotating, walk-behind or ride-on machine, of various size and weights, with diamond tooling affixed to the head for the purpose of grinding concrete. Excludes janitorial maintenance equipment.
 - a) Minimum three (3) head counter rotating, variable speed floor grinder with at least 600 pounds of down pressure.
 - 2. If dry grinding, honing, or polishing, use dust extraction equipment with flow rate suitable for dust generated, with squeegee attachments.
 - 3. If wet grinding, honing, or polishing, use slurry extraction equipment suitable for slurry removal and containment prior to proper disposal.
- B. Edge Grinding and Polishing Equipment: Hand-held or walk-behind machines with dust extraction attachments and pads which produces same results, without noticeable differences, as field grinding and polishing equipment.
- C. Burnishing Equipment: High speed walk-behind or ride-on machines capable of generating 1000 to 2000 revolutions per minute and with sufficient head pressure of not less than 20 pounds to raise floor temperature by 20 degrees F.
- D. Diamond Tooling: Abrasive tools that contain industrial grade diamonds within a bonded matrix (such as metallic, resinous, ceramic, etc.) that are attached to rotating heads to refine the concrete substrate.
 - 1. Bonded Abrasive: Abrasive medium that is held within a bonding that erodes away to expose new abrasive medium as it is used.
 - 2. Metal Bond Tooling: Diamond tooling that contains industrial grade diamonds with a metallic bonded matrix that is attached to rotating heads to refine the concrete substrate. These tools are available in levels of soft, medium, and hard metallic matrices that are matched with contrasting concrete substrates (i.e. hard matrix/soft concrete, medium matrix/medium concrete, soft matrix/hard concrete) and are typically used in the grinding and early honing stages of the polishing process.
 - 3. Resin Bond Tooling: Diamond tooling that contains industrial grade diamonds within a resinous bonded matrix (poly-phenolic, ester-phenolic, thermoplastic-phenolic) that is attached to rotating heads to refine the concrete substrate. Resin bond tooling does not have the soft/medium/hard characteristics of metal bond tooling and are typically used for the later honing and polishing stages of the polishing process.

4. Hybrid Tooling: Diamond tooling that combines metal bond and resin bond that has the characteristics of both types of tooling. These types of tools are typically used as either transitional tooling from metal bond tools to resin bond tools or as a first cut tool on smooth concrete surfaces.
 5. Transitional Tooling: Diamond tooling that is used to refine the scratch pattern of metal bond tooling prior to the application of resin bond tooling in an effort to extend the life of resin bond tooling and to create a better foundation for the polishing process.
 6. Abrasive Pad: An abrasive pad, resembling a typical floor maintenance burnishing pad, that has the capability of refining the concrete surface on a microscopic level that may or may not contain industrial grade diamonds. These pads are typically used for the maintenance and/or restoration of previously installed polished concrete flooring.
- E. Power Supply: Ensure appropriate power sources, generators, etc. as required to produce specified work and avoid disruption or delays on the project.
 - F. Dust Extraction: Provide dust extraction system, pre-separator, and squeegee attachments with minimum flow rating of 580 cubic feet per minute.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify project site conditions under provisions of Section 01 00 00.
- B. Compliance: Comply with manufacturer's instructions for installation of materials. Existing concrete must have a minimum compressive strength of 3000 psi and a minimum density of 100 pcf (pounds per cubic foot).
- C. Coordinate installation with adjacent work to ensure proper sequencing of construction.
- D. Protect adjacent and surrounding surfaces not specified to receive overlay with necessary means to ensure protection against overspray, water or other harmful debris.
- E. Close off areas receiving overlay during installation from all traffic and stop excessive air movement across the top of the surface until overlay has reached final set.
- F. Advise Contractor of discrepancies preventing proper installation of materials. Do not proceed with the work until unsatisfactory conditions are corrected.

3.2 VAPOR TESTING CONCRETE FLOORS

- A. Alkalinity:
 1. Test Method: Measure pH according to method indicated in ASTM F 710.
 2. Acceptable Results: pH between 8 and 14.
- B. Moisture Vapor Transmission Rate:
 1. Test Method: Perform anhydrous calcium chloride test according to ASTM F 1869.
 2. Acceptable Results: Up to 10 pounds per 1000 square feet in 24 hours when one coat of TXP Fast primer is used at a minimum 10 mils thickness.
 - a. When test results indicate over 10 pounds up to 20 pounds per 1000 square feet in 24 hours, use two coats of TXP Fast or TXP EP-105UF Primer as follows:
 - i. Apply two coats with the first coat applied neat at a minimum 16 mil thickness, followed by a second coat at a minimum of 10 mils with full broadcast aggregate to achieve a total minimum thickness of 26 mils.
- C. Relative Humidity:
 1. Test Method: Perform relative humidity test using in situ probes according to ASTM F 2170.

- D. Acceptable Results: Up to 100 percent. When additional sealers, guards or coatings are used, the manufacturer's MVT and RH recommendations must be followed.

3.3 PREPARATION

- A. Mechanically roughen surfaces and remove all loose, unsound, contaminated material.
- B. Use appropriate mechanical means and methods to completely remove existing floor coverings, coatings, mastics, paints, adhesives and other floor materials that may inhibit bond.
- C. Bonding surfaces must be clean, sound, and free from any materials that may inhibit bond such as oil, dirt, asphalt, sealing compounds, acids, wax and loose dust and debris. D. Prevent damage to substrate during demolition and preparation.
- E. Correct conditions that are found to be out of compliance with the requirements of this section, to include substrate repair and pre-leveling, joint and crack treatment as required to achieve the specified finish.
- F. Mechanically prepare the substrate to an ICRI CSP 3-5.
- G. Where required, place divider/terrazzo strips. Level and set strips to appropriate heights prior to pouring the overlay.
- H. Pin or otherwise mark all existing joint locations to ensure they can be located and re-saw cut after placement of topping.
- I. Prime the prepared concrete in accordance with manufacturer's published procedures and recommendations.
- J. Immediately broadcast washed and kiln dried angular cut #20 - #30 grit silica sand onto epoxy primer ensuring complete coverage prior to initial set. Broadcast to refusal. K. After epoxy primer cures, remove all loose silica sand.

3.4 MIXING

- A. Comply with manufacturer's printed instructions.
- B. Include careful monitoring of mix water volume being used, with allowance for the following special designs.
 - 1. Any decorative aggregates used and loading dosage as recommended and approved by the overlay manufacturer.
 - 2. Integral colorants. Must be approved by the overlay manufacturer and water volume per mix verified.
- C. Use CS Unitec (Hippo Mixer), batch mixers or equivalent to prepare overlay material. If barrel mixing, use a 1/2" heavy-duty drill (12 mm) with a minimum of 650 rpm.
- D. Clean barrels/mixers periodically and use a 1/8" screen (#8 Classifier) to remove any unmixed and/or hardened material prior to placing the mixed overlay onto the floor.
- E. Verify proper flow using the Rapid Set® Self Leveling Products Field Flow Test. **3.5**

APPLICATION

- A. Comply with manufacturer's printed instructions and the following:
 - 1. Verify that all substrates and ambient temperatures are between 50°F (10°C) and 90°F (32°C) and will remain within range until the overlay has reached full cure. Ideal installation conditions are 60°F (15.6°C) to 80°F (26.7°C).
 - 2. To prevent pinholing and micro-crazing, eliminate air movement over the surface and do not apply overlay when relative humidity is below 30%.

3. Have all required tools, equipment and materials organized and as close to the placement area as possible.
 4. Pour or pump overlay and spread in place with a gauge rake set at the appropriate thickness. Use the Rapid Set TRU®Spiked Roller to coax the material into place. Use rounded metal spiked shoes to avoid damaging the primer. Contact the CTS Cement Technical Support (800.929.3030) if other tools are required. Use methods that avoid pinholes.
 5. Place overlay to grade levels required and to conform to drawing details.
 6. The minimum installation thickness must be 3/8" minimum. For high-load, rubber wheeled traffic areas, nominal thickness must be 1/2" minimum.
- B. Pre-Leveling: Use Rapid Set LevelFlor® from featheredge to 1" (2.5 cm) thick and up to 5" (12.7 cm) thick when extended with aggregate. Mix and install according to manufacturer's published instructions. Allow the pre-leveling course to dry at least 12 to 16 hours before application of primer and overlay.

3.6 CURING

- A. For exterior applications, apply a fine water mist to newly hardened surface as soon as it can be done without marring the surface. Fine water mist continuously until one hour after final set. B. Allow topping to cure for a minimum of four (4) hours prior to saw cutting joints.
- C. Prevent damage to overlay and protect from all traffic for the length of time recommended by the manufacturer.

3.7 COLORING CONCRETE FLOORS

- A. Dye or Pigmented Micro Stain Application:
1. Apply solution by methods and techniques required by manufacturer to produce finish matching approved field mock-ups.
 2. Maintain wet edge, working newly applied solution into edges of adjacent wet edges of previously treated surfaces.
 3. Maintain consistent saturation throughout application.
 4. Avoid splashing, dripping, or puddling of solution on adjacent substrates.
 5. When color matches approved mock-ups, neutralize as required by manufacturer.

3.8 JOINT CUTTING, PREPARATION AND FILLING

- A. Joints must be installed prior to the polishing process.
- B. Honor all existing joints. Locate original joint locations and saw cut through topping into the original joint. Saw blade must penetrate to the depth of the original joint or 2" deep, whichever is smaller. Prefill joints greater than 2" deep.
- C. Ensure saw-cut joint is completely free of dust/debris/laitance.
- D. Apply stain prevention film or other masking agent along surface on both sides of the joint to avoid residual staining.
- E. Install joint filler. Fill from the bottom of the joint, being careful to avoid entrapping air.
- F. Slightly overfill joint to a crowned profile.
- G. After sufficient cure, razor excess filler leaving a filler profile that is flush with floor surface.
- H. If filler profile is low/concave, remove top 1/2" of filler and re-apply.

3.9 POLISHING

- A. Allow overlay to cure for a minimum of 24 hours before beginning the polishing process.
- B. Use overlay manufacturer's approved polishing system from one of the following manufacturers:
 - 1. HTC
 - 2. SASE
 - 3. Husqvarna
 - 4. Lavina
 - 5. STI
- C. Comply with overlay manufacturer's and polishing equipment manufacturer's published Technical Bulletins and guidelines.

3.10 SEALING

- A. Apply densifiers, sealers, guards or stain protectors per manufacturers' instructions.
- B. Achieve waterproofing, hardening, dust-proofing, and abrasion resistance of the surface without changing the designed aesthetics of the finish.

3.11 PROTECTION

- A. Prevent damage to overlay and protect from all traffic for at least 72 hours after final surface treatment.
- B. Do not allow standing water, rubber matting, or other non-breathable objects onto the polished surface.
- C. Protect the finished surfaces from damage, soiling and other construction activities.
- D. Provide suitable protective cover without damaging the polished surface.
- E. Follow maintenance guidelines as provided in Section 1.4 Submittals.

3.12 CLEAN-UP

- A. Remove and legally dispose of debris material from job site.
- B. Clean excess material from surrounding areas and all tools immediately, before material cures. If materials have cured, remove using mechanical methods that will not damage the substrate.
- C. Clean adjacent surfaces as needed using materials and methods recommended by the manufacturer of the material being cleaned. Remove and replace work that cannot be cleaned to the satisfaction of the Project Designer/Owner.

END OF SECTION

SECTION 05 99 90 SIMPSOM STRONG TIE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements pertaining to post-installed and cast-in-place anchors for materials and equipment. This section pertains to all other sections of these specifications that require post-installed or cast-in-place anchors, unless specified otherwise.

1.02 RELATED DOCUMENTS

- A. Division 1 General Requirements
- B. Division 3 Concrete
- C. Division 4 Masonry
- D. Division 5 Metals
- E. Division 6 Wood, Plastics and Composites
- F. Division 9 Ceiling Suspension Systems
- G. Division 21 Fire Suppression Equipment Support
- H. Division 22 Plumbing Equipment Support
- I. Division 23 HVAC Equipment Support
- J. Division 26 Electrical Equipment Support

1.03 REFERENCES

- A. ACI 318 – Building Code Requirements for Structural Concrete
- B. ACI 355.2 – Qualification of Post-Installed Mechanical Anchors in Concrete
- C. ACI 355.4 – Qualification of Post-Installed Adhesive Anchors in Concrete
- D. ANSI B212.15 – Cutting Tools - Carbide-tipped Masonry Drills And Blanks For Carbide-tipped Masonry Drills
- E. ASTM A36 – Standard Specification for Carbon Structural Steel
- F. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- G. ASTM A193 – Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
- H. ASTM A510 – Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
- I. ASTM A615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
- J. ASTM A706 – Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
- K. ASTM B633 – Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
- L. ASTM B695 – Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
- M. ASTM C881 – Standard Specification Epoxy-Resin-Based Bonding Systems for Concrete
- N. ASTM E488 – Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements
- O. ASTM E1190 – Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members
- P. ASTM E1512 – Standard Test Methods for Testing Bond Performance of Bonded Anchors
- Q. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
- R. ASTM F1624 – Standard Test Method for Measurement of Hydrogen Embrittlement Threshold in Steel by the Incremental Step Loading Technique
- S. Federal Specifications A-A-1922A and A-A-55614 for Expansion and Shield-Type Anchors
- T. ICC-ES AC01 – Acceptance Criteria for Expansion Anchors in Masonry Elements
- U. ICC-ES AC58 – Acceptance Criteria for Adhesive Anchors in Masonry Elements
- V. ICC-ES AC60 – Acceptance Criteria for Anchors in Unreinforced Masonry Elements
- W. ICC-ES AC70 – Acceptance Criteria for Fasteners Power-Driven into Concrete, Steel and

Masonry Elements

- x. ICC-ES AC106 – Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements
- y. ICC-ES AC193 – Acceptance Criteria for Mechanical Anchors in Concrete Elements
- z. ICC-ES AC308 – Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements

1.04 SUBMITTALS AND SUBSTITUTIONS

- A. Submittals are to be in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section. To create a product submittal, click [Submittal](#).
 - 1. Submit product data for proprietary products and materials that include:
 - i. Product Information
 - ii. Technical Information
 - iii. Material Safety Data Sheets (MSDS)
 - iv. Manufacturer's Published Installation Instructions (MPII)
 - 2. Submit code reports and agency listings as applicable that include:
 - i. ICC-ES Evaluation Report
 - ii. IAPMO-UES Evaluation Report
 - iii. City of Los Angeles
 - iv. Underwriters Laboratories
 - v. Factory Mutual
- B. Substitutions: Substitute in accordance with Conditions of the Contract and Division 1 Substitution Procedures Section. To create a product substitution, click [Substitution](#).
 - 1. Only manufacturers with an ICC-ES or IAPMO-UES listing will be considered for substitution requests.
 - 2. The contractor shall submit, for Architect-of-Record's review, calculations that are prepared & sealed by a registered Professional Architect demonstrating that the substituted product is capable of achieving the pertinent equivalent performance values of the specified product using the appropriate design procedure and/or standard(s) as required by the Building Code.
 - 3. In addition, the calculations shall specify the diameter and embedment depth of the substituted product.
 - 4. Any increase in material costs for such submittal shall be the responsibility of the contractor.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: The installer shall be experienced in installing anchors equal to type, and into the substrate material required for this project. See PART 3 EXECUTION.
- B. Evaluations Reports and Listings: Anchors and related materials shall be listed by one or more of the following agencies, as applicable:
 - 1. ICC Evaluation Service
 - i. Anchors shall be manufactured under an approved quality assurance program with follow- up inspections by an inspection agency under ISO/IEC 17020 by a recognized accreditation body conforming to the requirements of ISO/IEC 17011.
 - 2. IAPMO Uniform Evaluation Service
 - i. Anchors shall be manufactured under an approved quality assurance program with follow- up inspections by an inspection agency under ISO/IEC 17020 by a recognized accreditation body conforming to the requirements of ISO/IEC 17011.
 - 3. Puerto Rico
 - 4. Underwriters Laboratories (UL)
 - 5. Factory Mutual (FM)

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to job site in manufacturer's or distributor's packaging undamaged, complete with installation instructions.
- B. Protect and handle materials in accordance with manufacturer's recommendations to prevent damage or deterioration.

1.07 PROJECT CONDITIONS

- A. Adhesive anchors shall be installed in concrete having a minimum age of 21 days at time of anchor installation.
- B. Anchoring adhesives must be stored at temperatures prescribed by the manufacturer and must not be used beyond the expiration date.
- C. The anchor or fastener coating, plating or steel type must provide suitable corrosion resistance for the environment in which the anchor or fastener is installed.

PART 2 PRODUCTS

2.01 DIVISION 03 00 00 CONCRETE Section 03 1600 Concrete Anchors

A. Expansion Anchors for Cracked and Uncracked Concrete

- 1. Expansion anchors are post-installed torque-controlled mechanical expansion anchors used to transmit structural loads by means of tension, shear, or a combination of both between: (a) connected structural elements; or (b) safety-related attachments and structural elements. Anchors shall be designed in accordance with ACI 318 Appendix D, which requires post-installed mechanical anchors to be qualified according to ACI 355.2. Such anchors shall be imperial sized, threaded stud with an integral cone expander and three-segment expansion clip. The stud shall be manufactured from carbon steel or type 316 stainless steel. The expansion clip shall have 2 undercutting embossments per segment and be manufactured from carbon steel or 316 stainless steel. Carbon steel anchors shall have an electroplated zinc finish in accordance with ASTM B633, Class SC1, Type III. Anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested and qualified for performance in cracked and uncracked concrete in accordance with ACI 355.2 and ICC-ES AC193 for all mandatory tests and including the following:
 - i. Seismic tension in cracked concrete
 - ii. Seismic shear in cracked concrete
- 2. Expansion anchors for cracked and uncracked concrete shall be:
 - i. Simpson Strong-Tie Strong-Bolt 2 Wedge Anchor, ICC-ES ESR-3037 (carbon steel or type 316 or 304 stainless steel)

B. Screw Anchors for Cracked and Uncracked Concrete

- 1. Screw anchors are post-installed concrete anchors used to transmit structural loads by means of tension, shear, or a combination of both between: (a) connected structural elements; or (b) safety-related attachments and structural elements. Anchors shall be designed in accordance with ACI 318 Appendix D as amended by the specific design provisions of ICC-ES AC193. Anchors shall be manufactured from carbon steel which is subsequently heat-treated. Anchors shall be zinc-plated in accordance with ASTM B633, Class SC1, Type III. Anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested and qualified for performance in cracked and uncracked concrete in accordance with ICC-ES AC193 for all mandatory tests and including the following:
 - i. Seismic tension in cracked concrete
 - ii. Seismic shear in cracked concrete
- 2. Screw anchors for cracked and uncracked concrete shall be:
 - i. Simpson Strong-Tie Titen HD Screw Anchor, ICC-ES ESR-2713 or
 - ii. Simpson Strong-Tie Titen HD Rod Hanger, ICC-ES ESR-2713

C. Self-Undercutting Anchors for Cracked and Uncracked Concrete

1. Self-undercutting anchors are post-installed torque-controlled anchors that cut their own undercut by application of setting torque that forces a sleeve over a cone used to transmit structural loads by means of tension, shear, or a combination of both between: (a) connected structural elements; or (b) safety-related attachments and structural elements. Anchors shall be designed in accordance with ACI 318 Appendix D, which requires post-installed mechanical undercut anchors to be qualified according to ACI 355.2. Self-undercutting anchors shall be imperial sized and have an expansion ring with undercutting teeth that expand over a cone upon tightening of the nut. Threaded rod, spacer sleeve, undercut expansion ring and expansion cone shall be manufactured from carbon steel and shall be zinc-plated in accordance with ASTM B633, Class SC1. Anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested and qualified for performance in cracked and uncracked concrete in accordance with ACI 355.2 and ICC-ES AC193 for all mandatory tests and including the following:
 - i. Seismic tension in cracked concrete
 - ii. Seismic shear in cracked concrete
2. Self-undercutting anchors for cracked and uncracked concrete shall be:
 - i. Simpson Strong-Tie Torq-Cut Self-Undercutting Anchor, ICC-ES ESR-2705

D. Adhesive Anchors for Cracked and Uncracked Concrete

1. An adhesive anchor shall consist of: 1) threaded rod or reinforcing bar insert; and 2) adhesive formula. Threaded rod inserts shall meet the minimum requirements of ASTM F1554 Grade 36, ASTM A193 Grade B7, ASTM A193 Grade B6 (Type 410 Stainless Steel) or ASTM A193 Grade B8 and B8M (Types 304 and 316 Stainless Steel). Reinforcing bar inserts shall meet the minimum requirements of ASTM A615 Grade 60 or ASTM A706 Grade 60. For exterior exposure the insert shall be stainless steel. Inserts in contact with preservative-treated and fire-retardant-treated wood shall be zinc coated in accordance with ASTM A153 Class C or D or stainless steel or demonstrated through tests to be equivalent to the coatings described. Adhesives shall be injectable, two-component, cartridge-type systems dispensed and mixed through a static mixing nozzle supplied by the manufacturer. Acceptable installation and performance temperature ranges shall be verified with manufacturer's literature prior to installation.
2. Adhesive anchors are post-installed anchors used to transmit structural loads by means of tension, shear, or a combination of both between: (a) connected structural elements; or (b) safety-related attachments and structural elements. Adhesive anchors shall be designed in accordance with ACI 318 Appendix D as amended by the specific design provisions of ICC-ES AC308. Adhesive anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested and qualified for performance in cracked and uncracked concrete in accordance ICC-ES AC308 for all mandatory tests and including the following:
 - i. Seismic tension in cracked concrete
 - ii. Seismic shear in cracked concrete
 - iii. Horizontal and overhead applications
 - iv. Installation in saturated concrete
 - v. Sensitivity to freeze/thaw conditions
 - vi. Long term creep at elevated temperatures
3. Adhesive anchors for cracked and uncracked concrete shall be:
 - i. Simpson Strong-Tie SET-XP Epoxy Adhesive, ICC-ES ESR-2508
4. Adhesive anchors for cracked and uncracked concrete and decreased installation temperature (14°F) shall be:
 - i. Simpson Strong-Tie AT-XP Acrylic Adhesive, IAPMO-UES ER-263

E. Sleeve Anchors for Uncracked Concrete

1. Sleeve anchors are post-installed torque-controlled mechanical expansion anchors used to transmit medium duty, non-seismic loads to uncracked concrete by means of tension, shear, or a combination of both. Anchors shall be assigned allowable tension and shear loads for designs based on allowable stress design in uncracked concrete. Such anchors shall be imperial sized, threaded anchor body with an expansion sleeve. The stud shall be manufactured from zinc plated carbon steel or type 316 stainless steel. The expansion sleeve shall be manufactured from zinc plated carbon steel or 316 stainless steel. Anchors shall have Factory Mutual (FM) approval, an Underwriters Laboratories (UL) listing, meet the requirements of Federal Specification A-A-1922A and be tested for performance in uncracked concrete.
2. Sleeve anchors for uncracked concrete shall be:
 - i. Simpson Strong-Tie Sleeve-All Anchor carrying the following approvals and listings:
 - ii.
 - a. Factory Mutual 3017082, 3026805, 3029959, and 3043442, 3/8" 3/4" dia.
 - b. Underwriters Laboratories File Ex3605, 3/8"-3/4" dia.
 - c. Meets requirements of Federal Specifications A-A-1922A

F. Drop-In Anchors for Uncracked Concrete

1. Drop-In anchors are post-installed displacement-controlled mechanical expansion anchors used to transmit medium duty, non-seismic loads by means of tension, shear, or a combination of both to uncracked normal- weight concrete, through the deck of sand-lightweight concrete over metal deck and uncracked hollow core concrete panel. Anchors shall be assigned allowable tension and shear loads for designs based on allowable stress design in uncracked concrete. Such anchors shall be imperial sized, internally threaded anchor body with a preassembled expander plug. The anchor body and expander plug shall be manufactured from zinc plated carbon steel or type 303 or 316 stainless steel. Anchors shall have Factory Mutual (FM) approval, an Underwriters Laboratories (UL) listing, meet the requirements of Federal Specification A-A-55614, Type 1 and be tested for performance in uncracked concrete.
2. Drop-In anchors for uncracked concrete shall be:
 - i. Simpson Strong-Tie Drop-In Anchor carrying the following approvals and listings:
 - a. Factory Mutual 3017082
 - b. Underwriters Laboratories File Ex3605.
 - c. Meets requirements of Federal Specifications A-A-55614, Type 1

2.02 DIVISION 03 00 00 CONCRETE

Section 03 15 00 Concrete Accessories

Section 03 15 19 Cast-In Concrete Anchors

A. Cast-In-Place Inserts for Concrete

1. Cast-in-place inserts are internally multi-thread designed inserts installed through metal deck or attached to wood forms prior to placement of normal-weight or sand-lightweight concrete used to transmit structural loads by means of tension, shear, or a combination of both between: (a) connected structural elements; or (b) safety- related attachments and structural elements. Inserts shall be assigned allowable tension and shear loads for designs based on allowable stress design in concrete. Such anchors shall be imperial sized with an internal multi-thread design. The insert shall be manufactured from carbon steel and have a yellow zinc dichromate finish. Anchors shall have Factory Mutual (FM) approval, an Underwriters Laboratories (UL) listing and be tested for performance in normal-weight and sand-lightweight concrete.
2. Cast-in-place inserts for concrete shall be:
 - i. Simpson Strong-Tie Blue Banger Hanger Cast-In-Place Inserts carrying the following approvals and listings:
 - a. Factory Mutual 3024378
 - b. Underwriters Laboratories File Ex3605

- c. UL Standard 2043, 2nd Edition “Fire test for heat and visible smoke release for discrete products and their accessories installed in air-handling spaces” (multi-thread metal deck insert only)

2.03 DIVISION 04 00 00 MASONRY
Section 04 05 19.16 Masonry Anchors

A. Expansion Anchors for Grout-Filled Concrete Masonry Units

1. Expansion anchors are post-installed torque-controlled mechanical expansion anchors used to transmit structural loads by means of tension, shear, or a combination of both between: (a) connected structural elements; or (b) safety-related attachments and structural elements. Anchors shall be assigned allowable tension and shear loads for designs based on allowable stress design in fully grouted concrete masonry units. Such anchors shall be imperial sized, threaded stud with an integral cone expander, expansion clip, nut and washer. The stud shall be manufactured from carbon steel. The expansion clip shall be manufactured from carbon steel. Carbon steel anchors shall have an electroplated zinc finish in accordance with ASTM B633, Class SC1, Type III or shall be mechanically galvanized in accordance with ASTM B695, Class 55, Type 1, as appropriate. Anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested and qualified for performance in grout-filled concrete masonry in accordance with ICC-ES AC01 for all mandatory tests and including the following:
 - i. Seismic tension in grout-filled concrete masonry units
 - ii. Seismic shear in grout-filled concrete masonry units
2. Expansion anchors for concrete masonry units shall be:
 - i. Simpson Strong-Tie Strong-Bolt 2 Wedge Anchor, IAPMO-UES ER-240 (carbon steel) or
 - ii. Simpson Strong-Tie Wedge-All Anchor, ICC-ES ESR-1396 (carbon steel or mechanically galvanized)

B. Screw Anchors for Grout-Filled Concrete Masonry Units

1. Screw anchors are post-installed concrete anchors used to transmit structural loads by means of tension, shear, or a combination of both between: (a) connected structural elements; or (b) safety-related attachments and structural elements. Anchors shall be assigned allowable tension and shear loads for designs based on allowable stress design in fully grouted concrete masonry units. Anchors shall be manufactured from carbon steel which is subsequently heat-treated. Anchors shall be zinc-plated in accordance with ASTM B633, Class SC1, Type III or shall be mechanically galvanized in accordance with ASTM B695, Class 55, Type 1, as appropriate. Anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested and qualified for performance in grout-filled concrete masonry in accordance with ICC-ES AC106 for all mandatory tests and including the following:
 - i. Seismic tension in grout-filled concrete masonry units
 - ii. Seismic shear in grout-filled concrete masonry units
2. Screw anchors for concrete masonry units shall be:
 - i. Simpson Strong-Tie Titen HD Screw Anchor, ICC-ES ESR-1056

C. Adhesive Anchors for Grout-Filled Concrete Masonry Units

1. An adhesive anchor shall consist of: 1) threaded rod or reinforcing bar insert; and 2) adhesive formula. Threaded rod inserts shall meet the minimum requirements of ASTM F1554 Grade 36, ASTM A193 Grade B7, ASTM A193 Grade B6 (Type 410 Stainless Steel) or ASTM A193 Grade B8 and B8M (Types 316 Stainless Steel). Reinforcing bar inserts shall meet the minimum requirements of ASTM A615 Grade 40. For exterior exposure the insert shall be stainless steel. Inserts in contact with preservative-treated and fire-

retardant-treated wood shall be zinc coated in accordance with ASTM A153 Class C or D or stainless steel or demonstrated through tests to be equivalent to the coatings described. Adhesives shall be injectable, two- component, cartridge-type systems dispensed and mixed through a static mixing nozzle supplied by the manufacturer. Acceptable installation and performance temperature ranges shall be verified with manufacturer's literature prior to installation.

2. Adhesive anchors are post-installed anchors used to transmit structural loads by means of tension, shear, or a combination of both between: (a) connected structural elements; or (b) safety-related attachments and structural elements. Adhesive anchors shall be assigned allowable tension and shear loads for designs based on allowable stress design in fully grouted concrete masonry units. Adhesive anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested and qualified for performance in grout-filled concrete masonry units in accordance ICC-ES AC58 for all mandatory tests and including the following:
 - i. Seismic tension in grout-filled concrete masonry units
 - ii. Seismic shear in grout-filled concrete masonry units
 - iii. Sensitivity to freeze/thaw conditions in grout-filled concrete masonry units
 - iv. Long term creep at elevated temperatures in grout-filled concrete masonry units
3. Adhesive anchors for concrete masonry units shall be:
 - i. Simpson Strong-Tie SET-XP Epoxy Adhesive, IAPMO-UES ER-265 or
 - ii. Simpson Strong-Tie AT-XP Acrylic Adhesive, IAPMO-UES ER-281 or
 - iii. Simpson Strong-Tie ET-HP Epoxy Adhesive, IAPMO-UES ER-241

D. Sleeve Anchors for Grout-Filled Concrete Masonry Units

1. Sleeve anchors are post-installed torque-controlled mechanical expansion anchors used to transmit medium duty, non-seismic loads to concrete masonry units by means of tension, shear, or a combination of both. Anchors shall be assigned allowable tension and shear loads for designs based on allowable stress design in fully grouted concrete masonry units. Such anchors shall be imperial sized, threaded anchor body with an expansion sleeve. The stud shall be manufactured from zinc plated carbon steel or type 304 stainless steel. The expansion sleeve shall be manufactured from zinc plated carbon steel or 316 stainless steel. Anchors shall have Factory Mutual (FM) approval, an Underwriters Laboratories (UL) listing, meet the requirements of Federal Specification A-A-1922A and be tested for performance in fully grouted concrete masonry units.
2. Sleeve anchors for concrete masonry units shall be:
 - i. Simpson Strong-Tie Sleeve-All Anchor carrying the following approvals and listings:
 - a. Factory Mutual 3017082, 3026805, 3029959, and 3043442, 3/8"–3/4" dia.
 - b. Underwriters Laboratories File Ex3605, 3/8"–3/4" dia.
 - c. Meets requirements of Federal Specifications A-A-1922A

E. Screw Anchors for Hollow Concrete Masonry Units

1. Screw anchors are post-installed concrete anchors used to transmit medium duty, non-seismic loads to hollow concrete masonry units by means of tension or shear, or a combination of both. Anchors shall be assigned allowable tension and shear loads for designs based on allowable stress design in hollow concrete masonry units. Anchors shall be manufactured from carbon steel which is subsequently heat-treated. Anchors shall be zinc-plated in accordance with ASTM B633, Class SC1, Type III. Anchors shall have been tested and qualified for performance in hollow concrete masonry units.
2. Screw anchors for hollow concrete masonry units shall be:
 - i. Simpson Strong-Tie Titen HD Screw Anchor

F. Adhesive Anchors for Hollow Concrete Masonry Units

1. An adhesive anchor shall consist of: 1) threaded rod insert; 2) adhesive formula; and 3) carbon steel, stainless steel or plastic screen tube. Threaded rod inserts shall meet the minimum requirements of ASTM F1554 Grade 36, ASTM A193 Grade B7, ASTM A193 Grade B6 (Type 410 Stainless Steel) or ASTM A193 Grade B8 and B8M (Types 316 Stainless Steel). For exterior exposure the insert shall be stainless steel. Inserts in contact with preservative-treated and fire-retardant-treated wood shall be zinc coated in accordance with ASTM A153 Class C or D or stainless steel or demonstrated through tests to be equivalent to the coatings described. Adhesives shall be injectable, two-component, cartridge-type systems dispensed and mixed through a static mixing nozzle supplied by the manufacturer. Acceptable installation and performance temperature ranges shall be verified with manufacturer's literature prior to installation.
2. Adhesive anchors are post-installed anchors used to transmit medium duty, non-seismic loads to hollow concrete masonry units by means of tension, shear, or a combination of both. Adhesive anchors shall be assigned allowable tension and shear loads for designs based on allowable stress design in hollow concrete masonry units. Adhesive anchors shall have been tested and qualified for performance in hollow concrete masonry units.
3. Adhesive anchors for hollow concrete masonry units shall be:
 - i. Simpson Strong-Tie SET Epoxy Adhesive (use carbon steel or plastic screen tube)
 - ii. Simpson Strong-Tie AT Acrylic Adhesive (use stainless steel or plastic screen tube)
 - iii. Simpson Strong-Tie ET-HP Epoxy Adhesive (use carbon steel or plastic screen tube)

G. Adhesive Anchors for Unreinforced Masonry

1. Adhesive anchors for existing unreinforced masonry walls having a minimum nominal thickness of 13 inches (three wythes of brick) shall consist of: 1) adhesive formula; and 2) Three types of adhesive anchor assemblies: Configuration A, threaded rods or steel reinforcing bars in shear, Configuration B, bent threaded rods in shear or tension (22 1/2-degree combination anchor), and Configuration C, through-bolts in tension and shear (combination anchor).
2. Threaded rod inserts shall meet the minimum requirements of ASTM F1554 Grade 36, ASTM A193 Grade B7, ASTM A193 Grade B6 (Type 410 Stainless Steel) or ASTM A193 Grade B8 and B8M (Types 304 and 316 Stainless Steel). Reinforcing bar inserts shall meet the minimum requirements of ASTM A615 Grade 40. For exterior exposure the insert shall be stainless steel. Inserts in contact with preservative-treated and fire-retardant-treated wood shall be zinc coated in accordance with ASTM A153 Class C or D or stainless steel or demonstrated through tests to be equivalent to the coatings described.
3. Configuration A consists of a 3/4-inch-diameter straight threaded rod or a No. 5 or No. 6, straight deformed steel reinforcing dowel bar, and a 8-inch-long steel wire or plastic mesh screen tube. This anchor must be embedded a minimum of 8 inches into the wall and is used when the outside wall is inaccessible. This anchor configuration resists shear loads only.
4. Configuration B consists of a 3/4-inch-diameter threaded rod prebent at a 22.5-degree angle and installed a minimum of 13 inches into the wall at a downward angle of 22.5 degrees, to within a maximum of 1 inch of the exterior wall surface. The prebent threaded rod is used with a 13-inch-long steel wire or plastic mesh screen tube. This anchor configuration resists tension and shear loads, and is used where the outside of the wall is inaccessible.
5. Configuration C consists of a 5/8-inch-diameter threaded rod; an 8-inch-long steel sleeve, formed from AISI 1010 steel, and a 8-inch-long steel screen tube. A 6-inch-by-6-inch-by-3/8-inch-thick ASTM A36 steel plate must be located on the back face of the

wall at the end of the threaded rod of the through-bolted connection. This anchor configuration resists tension and shear loads, and is used when the outside surface of the wall is accessible.

6. Adhesives shall be injectable, two-component, cartridge-type systems dispensed and mixed through a static mixing nozzle supplied by the manufacturer. Acceptable installation and performance temperature ranges shall be verified with manufacturer's literature prior to installation.
7. Adhesive anchors for unreinforced masonry are post-installed anchors used to transmit short-term earthquake and wind loads by means of tension, shear, or a combination of both. Adhesive anchors shall be assigned allowable tension and shear loads for designs based on allowable stress design in unreinforced masonry brick walls. Adhesive anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested and qualified for performance in unreinforced masonry brick walls in accordance ICC-ES AC60 for all mandatory tests.
8. Adhesive anchors for unreinforced masonry shall be:
 - i. Simpson Strong-Tie SET Epoxy Adhesive, ICC-ES ESR-1772 or
 - ii. Simpson Strong-Tie AT Acrylic Adhesive, ICC-ES ESR-1958 or
 - iii. Simpson Strong-Tie ET-HP Epoxy Adhesive, ICC-ES ER-4945

2.04 DIVISION 03 00 00 CONCRETE Section 03 16 00 Concrete Anchors

DIVISION 04 00 00 MASONRY Section 04 05 19.16 Masonry Anchors

DIVISION 05 00 00 METALS Section 05 05 23 Metal Fastenings

A. Gas-Actuated Fasteners and Assemblies

1. Gas-actuated fasteners are used for general fastening of building components, such as cold-formed steel framing members, to normal-weight and sand-lightweight concrete, steel deck with sand-lightweight concrete fill, structural steel, and hollow and grout-filled concrete masonry units.
2. Simpson Strong-Tie GDP and GDPS Gas-Actuated Fasteners are manufactured from steel complying with ASTM A510, Grade 1060 or 10B60, and austempered to a Rockwell "C" core hardness of 53-56. GDP fasteners have a straight, smooth shank with a diameter of 0.106 inch, and a head diameter of 0.24 inch. GDPS fasteners have a step-shank with a diameter of 0.118 inch above the step and a diameter of 0.102 inch below the step, and a head diameter of 0.24 inch. GDP fasteners are galvanized in accordance with ASTM B695, Class 5, Type I. GDPS fasteners are zinc electroplated in accordance with ASTM B633 SC1, Type I. Both GDP and GDPS fasteners are supplied in collated strips. Fasteners shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested in accordance with ICC-ES AC70.
3. Gas-Actuated Fasteners and Assemblies attached to normal-weight and sand-lightweight concrete, steel deck with sand-lightweight concrete fill, structural steel, and hollow and grout-filled concrete masonry units shall be:
 - i. Simpson Strong-Tie Gas-Actuated Fasteners and Assemblies, ICC-ES ESR-2811

2.05 DIVISION 03 00 00 CONCRETE Section 03 1600 Concrete Anchors

DIVISION 04 00 00 MASONRY Section 04 05 19.16 Masonry Anchors

DIVISION 05 00 00 METALS Section 05 05 23 Metal Fastenings

**DIVISION 06 00 00 WOOD, PLASTICS AND COMPOSITES
Section 06 05 23 Wood, Plastic and Composite Fastenings**

A. Powder-Actuated Fasteners, Threaded Studs and Assemblies

1. Powder-actuated fasteners and threaded studs are used to fasten building components, such as wood and steel, to normal-weight and sand-lightweight concrete, steel deck with sand-lightweight concrete fill, structural steel, and hollow and grout-filled concrete masonry units.
2. Simpson Strong-Tie fasteners and threaded studs are manufactured from steel complying with ASTM A510, Grades 1060 to 1065 or 10B60 to 10B65 and austempered to a Rockwell "C" core hardness of 51 to 56, except for PDPA headed fasteners, which are manufactured from steel complying with ASTM A510, Grade 1060, and austempered to a Rockwell "C" core hardness of 53 to 56. Unless otherwise noted in the evaluation report, the fasteners have a mechanically plated zinc finish complying with ASTM B695, Class 5, Type I. When installed with the powder-actuated fastening tool recommended by Simpson Strong-Tie, the fasteners pierce the material being fastened and embed into the supporting concrete, structural steel, hollow or grout-filled concrete masonry units substrate. Fasteners shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested in accordance with ICC-ES AC70.
3. Powder-actuated fasteners, threaded studs and assemblies attached to normal-weight and sand-lightweight concrete, steel deck with sand-lightweight concrete fill, structural steel, and hollow and grout-filled concrete masonry units shall be:
 - i. Simpson Strong-Tie Powder-Actuated Fasteners, Threaded Studs and Assemblies, ICC-ES ESR-2138

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine supporting base materials and environmental conditions. Do not begin installation until base materials have been properly prepared.
- B. Unless otherwise specified, do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
- C. Install only if environmental conditions are in compliance with manufacturer's recommendations for installation conditions.

3.02 INSTALLATION

- A. Adhesive anchors shall be installed in concrete having a minimum age of 21 days at time of anchor installation.
- B. Installation shall conform to the manufacturer's published installation instructions.
- C. Where holes are drilled in concrete or masonry, holes shall be accurately and squarely drilled, and the holes shall be cleaned in accordance with the manufacturer's recommendations.
- D. Unless otherwise noted, anchors shall be installed in holes drilled into base materials using carbide-tipped drill bits conforming to ANSI B212.15-1994.
- E. Where manufacturer recommends use of special tools for installation of anchors, such tools shall be used, unless otherwise permitted specifically by the Architect or Architect of Record.
- F. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Exercise care in drilling to avoid damaging existing reinforcing or embedded items. Notify the Architect if reinforcing steel or other embedded items are encountered during drilling.

1.01 FIELD QUALITY CONTROL

A. Special Inspection

1. Special inspection is defined in ACI 318 as a function performed by qualified special inspectors in the employ of the owner representatives or the owner representatives's agent. Inspection is particularly important for post-installed anchors to make certain that

the Manufacturer's Printed Installation Instructions (MPII) are followed. A distinction is made between continuous special inspection and periodic special inspection. Special Inspection, continuous or periodic, of post-installed anchors, shall be provided as required by ICC-ES or IAPMO-UES evaluation reports and/or as specified by the Architect of Record. This service shall be performed by personnel independent of the manufacturer or contractor so as to prevent a conflict of interest.

2. For mechanical anchors qualified for use in cracked and uncracked concrete in accordance with ICC-ES AC193, periodic special inspection is required.
3. For adhesive anchors qualified for use in cracked and uncracked concrete in accordance with ICC-ES AC308, installations may be made under continuous special inspection with an onsite proof loading program or periodic special inspection, as determined by the registered design professional. Strength reduction factors, Φ , and additional factors published in the evaluation report, and used in design, must correspond to the type of inspection provided.
4. For adhesive anchors qualified for use in cracked and uncracked concrete in accordance with ICC-ES AC308, where required, a program for on-site proof loading, that is, proof loading program, to be conducted as part of the special inspection shall be established by the Architect or design professional of record and shall conform to the following minimum requirements:
 - i. Frequency of proof loading based on anchor type, diameter, and embedment
 - ii. Proof loads by anchor type, diameter, embedment, and location
 - iii. Acceptable displacements at proof load
 - iv. Remedial action in the event of failure to achieve proof load or excessive displacement
5. Unless otherwise directed by the Architect or design professional of record, proof loads shall be applied as confined tension tests. Proof load levels shall not exceed the lesser of 50 percent of the expected peak load based on adhesive bond strength or 80 percent of the anchor yield strength. Maintain the proof load at the required load level for a minimum of 10 seconds.

B. Installer Certification

1. The following installer certification requirements apply to adhesive anchors assessed by the acceptance testing under ACI 355.4:
 - i. Adhesive anchors shall be installed by qualified personnel in accordance with the contract documents. The contract documents shall require installation of post-installed anchors in accordance with the Manufacturer's Printed Installation Instructions (MPII). Installation of adhesive anchors shall be performed by personnel trained to install adhesive anchors.
 - ii. Adhesive anchors installed in horizontal or upwardly inclined orientations to resist sustained tension loads shall be continuously inspected during installation by an inspector specially approved for that purpose by the building official. The special inspector shall furnish a report to the licensed design professional and building official that the work covered by the report has been performed and that the materials used and the installation procedures used conform with the approved contract documents and the manufacturer's printed installation instructions.
 - iii. Installation of adhesive anchors horizontally or upwardly inclined to support sustained tension loads shall be performed by personnel certified by an applicable certification program. Certification shall

include written and performance tests in accordance with the ACI/CRSI Adhesive Anchor Installer Certification program, or equivalent.

- iv. The acceptability of certification other than the ACI/CRSI Adhesive Anchor Installer Certification shall be the responsibility of the licensed design professional.

END OF SECTION

SECTION 06 20 00

CARPENTRY

For listing of subsections, see subsection index at end of

section. PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Furnish and install the necessary materials to do finished carpentry as indicated and as specified.

1.02 RELATED WORK:

- A. Section 09941: Field Painting

1.03 REFERENCES:

- A. Federal Specifications:
 - 1. TT-W-535C, Wood Preservative: Fluorchrome Arsenate Phenol Mixture.
 - 2. TT-W-571I(2), Wood Preservation: Treating Practices.
- B. American Wood Preserver's Association Standard for wood Pressure Treated with Water-Borne Preservatives, P5-78.

1.04 SUBMITTALS:

- A. Treated Wood: Certificates of Compliance

1.05 DELIVERY, STORAGE, AND HANDLING: Deliver to jobsite and store off the ground in a manner to ensure proper drainage, ventilation, and protection from the weather.

PART 2 - PRODUCTS

2.01 LUMBER MATERIALS:

- A. Provide lumber of grades and species indicated below for various uses listed:
 - 1. Nailers, cant strips and blocking: Standard grade
 - a. Douglas Fir, coast and inland.

- b. Fir, white
 - c. Hemlock, eastern and west coast
 - d. Spruce, eastern, Engelmann's and Sitka
- B. Sizes indicated are nominal.
- C. Dress four sides of lumber used in finish work.
- D. Moisture content of lumber:
 - 1. Kiln dried lumber not over 2-in. nominal thickness: Not to exceed 19 percent.
 - 2. Lumber over 2-in. nominal thickness, not kiln dried: To conform to the rules of the association under which it is graded. Incorporate into structure without further seasoning.

2.02 WOOD PRESERVATIVES:

- A. For wood encased in or in contact with concrete or masonry, and wood items incorporated in the roofing, use preservatives conforming to following:
 - 1. AWP standard P5-78
 - 2. Federal Specification TT-W-

535C PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Securely fasten and neatly fit carpentry with screws, nails, bolts, or spikes of ample size and suitable type.
 - 1. Secure wood work to masonry or other hard surfaces with expansion bolts and plugs or shield in a manner to provide rigid and permanent support.
 - 2. Countersink screws and bolts. Putty holes and sand smooth.
- B. Wood Nailers, Cants and Blocking:
 - 1. Anchor wood nailers with bolts and spike cant strips to nailer, as indicated, at edges of roofs and around roof openings.
 - 2. Install wood nailers in concrete bases under metal lockers.
 - 3. Provide wood blocking for base flashing and for pipe penetrations through roof, as indicated.
- C. Wood Preservatives:
 - 1. Apply preservatives in accordance with Federal Specification TT-W-571I(2), Treating Practices, Table III, Obtain notarized certificate of treatment from treatment company.

2. Prior to treatment, ensure that lumber is sawed to exact length and bored as required insofar as practicable.
3. Apply two heavy coats of preservative to any surfaces cut or bored after treatment, prior to installation.

PART 4 - SUBSECTION INDEX

A. GENERAL

- 1.01 Description
- 1.02 Related Work
- 1.03 References
- 1.04 Submittals
- 1.05 Delivery, Storage and Handling

B. PRODUCTS

- 2.01 Lumber Materials
- 2.02 Wood Preservatives

C. EXECUTION

- 3.01 Installation

* * *

SECTION 06 30 00

EPOXY REPAIR FOR DETERIORATION AND DECAY IN WOODEN MEMBERS

SUMMARY

Deterioration and decay in wood are the result of moisture infiltration and the accompanying fungal growth and insect infestation. Moisture can enter wood from many sources including the original moisture in green wood, rainwater, condensation, ground water, piped water, and water released by water-conducting fungus through the process of decay itself. To arrest the decay process, the wood must be dried. When the wood dries, the fungus will die or go dormant. To repair wood that has been damaged by fungus, one can replace the damaged portion or restore it with epoxy consolidant and filler.

This work task will discuss the repair of decayed wood member by the use of epoxy materials. Where the replacement of decayed members is warranted and since the replacement techniques differ with the application of wood, the specific replacement specifications should be consulted.

A. WORK INSTRUCTIONS

1. INSPECTION

- (a) Rot can be detected with the 'Pick Test'. An ice pick is inserted into the wood at a slight angle. When the pick is lifted out, the wood should splinter in long pieces. If wood snaps where pick is being lifted, the wood is decayed. (*figure 2*)
- (b) When rot is discovered.
 - (1) The first thing to do is to find the source of the moisture infiltration and eliminate *it*.
If rot is only present on the surface, drying is all that will be needed to stop the spread of decay and kill off any growth.
 - (2) If there is doubt about the source of moisture, the wood should be treated with a preservative. Preservatives are caustic chemicals and should be handled with care. A particularly dangerous wood preserving chemical is pentachlorophenol (a.k.a. penta). The use of it should be avoided.
 - (3) The use of a preservative will stop the growth of fungi; but it cannot restore material strength to an affected member. The member will have to be repaired with epoxy or replaced.

2. PREPARATION

- (a) Dry affected wood member completely. If complete drying is not possible in place, the member must be removed and kept in a cool dry place until dry. If this precaution is not taken, the epoxy can actually trap moisture in wood fibers and accelerate the decay process.
- (b) Organization and cleanliness are keys to proper epoxy repair. Have all materials at hand before the mixing process begins. Label all caps and lids so that a cap or lid is not placed

on the wrong container or it will be stuck there forever. Putting all materials associated with one part of the epoxy on the left and all associated with the other on the right helps keep things separated. Protect all adjacent surfaces from spills with plastic sheeting. If any epoxy happens to spill, wipe it up immediately before it sets or it will not come up.

3. EXECUTION

- (a) Drill 1/4" or 3/16" holes in affected wood to receive epoxy consolidant. (*figure 4*) Be sure not to drill through the entire surface for consolidant will leak out from behind. When working on a vertical surface, angle the holes so epoxy will not leak back out. Dam any surface cracks with oil clay so that epoxy will not leak.
- (b) Following manufacturer's instructions, mix a small amount of the consolidant components, the resin and the hardener, together in an applicator bottle. Stir the mixture thoroughly by hand with a thin stick for 4 minutes or with a bent coat hanger chucked into a drill for 2 minutes.
- (c) Carefully squirt the consolidant into the pre-drilled holes. (*figure 5*) The aim is to completely saturate the wood. Move from hole to hole refilling until the wood can hold no more. More than one application may be needed.
- (d) If severed pieces need to be re-attached, glue them in place with a mixture of consolidant and filler.:- (*figure 6*)
- (e) After the consolidant has cured, the voids in the surface can be filled with epoxy filler. If the voids are large, filler can be applied in succession, 1" of depth at a time. This cuts down on the possibility of problems associated with heat build-up.
- (f) Mixing of the two-part epoxy filler is similar to the consolidant. When mixed, the filler has the consistency of a glazing compound and can be worked with a putty knife. The surface of the filler should be built up slightly above of the wood surface to allow for planing and sanding smooth after it has cured.
- (g) After the filler has cured, the surface can be smoothed. (*figure 7*) A wood preservative can be applied to surrounding wood surfaces and the whole surface should be primed and painted properly.

4. RESOURCE REQUIREMENTS

1. MATERIALS

- (a) Epoxy consolidant and epoxy filler, both are multiple part compounds. It is recommended that it be purchased by the gallon unless a large amount of epoxying needs to be done.

2. EQUIPMENT

- (a) Plastic bottles, like those used for hair dye, to apply the consolidant; having many on hand is recommended. Cleaning of the bottles for reuse is possible.
- (b) Rags of different sizes to wipe up spills before epoxy has a chance to harden, small rags are recommended for quick one time uses such as wiping off spouts and caps.

- (c) Thin wooden sticks, approximately 8" long for scooping out paste and mixing consolidant.
 - (d) Two pairs of medium-duty nitril rubber gloves and one box of disposable vinyl gloves for protection from contact with epoxy.
 - (e) Goggles and a respirator for protection from fumes.
 - (f) Oil clay that can be purchased from a hobby store used to keep consolidant from leaking through cracks.
 - (g) Putty knives for application of filler.
 - (h) Channel lock pliers for opening stuck caps.
 - (i) Allen wrench to clean out cap holes.
 - (j) Needle nose pliers to Pull out hardened epoxy.
 - (k) 1/8" x 8' x 12' Masonite boards for mixing paste filler.
- (1) Because curing epoxy does create heat, have a carbon dioxide fire extinguisher on hand.

5. HISTORIC STRUCTURE PRECAUTIONS

- (a) No smoking is allowed by repairs persons around historic structures.
- (b) If historic materials cannot be saved, the replacement piece must be an accurate duplicate of the original and installed using the exact manner as the original. If the original manner of installation is unknown, follow recognized standards.
- (c) All materials that are removed should be inconspicuously marked with the date and a symbol designating repair or maintenance.
- (d) Concealed carpentry need not duplicate the concealed historic material but must be of similar thickness to provide equivalent support, durability, and strength. If the historic work has a unique feature in the concealed carpentry, duplicate it.

SECTION 07 10 00
DAMPPROOFING AND WATERPROOFING

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PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fluid-applied dampproofing.
- B. Fluid-applied waterproofing.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM C836 - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
 - 2. ASTM D412 - Tests for Rubber Properties in Tension
 - 3. ASTM D1187 - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
 - 4. ASTM D1227 - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.
 - 5. ASTM D4479 - Standard Specification for Asphalt Roof Coatings - Asbestos-Free.
 - 6. ASTM D4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
 - 7. ASTM E96 - Water Vapor Transmission of Materials.
- B. Federal Specifications:
 - 1. MIL-R-3472 Roof Coating, Asphalt Base Emulsion.
 - 2. SS-A-694 Asphalt Roof Coating (Brushing & Spraying Consist).
 - 3. SS-C-153 - Cement, Bituminous, Plastic.
 - 4. SS-R-1781 - Roof-Coating, Asphalt-Base Emulsion.
 - 5. SS-W-110 - Water-Repellent Colorless, Silicone Resin Base.
- C. National Standard of Canada 37.58 - M86.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01 33 00 – Submittal Procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Warranty: Submit a sample warranty identifying the terms and conditions stated in Warranty article.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Applicator shall be experienced in applying the same or similar materials.
- B. Regulatory Requirements: Comply with applicable codes, regulations, ordinances, and laws regarding use and application of products that contain volatile organic compounds (VOC).

- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship is approved by Architect.
 - 3. Rebuild mock-up area as required to produce acceptable work.

1.5 PRE-INSTALLATION MEETINGS

- A. Pre-Installation Conference: Prior to beginning work, convene a conference to review conditions, installation procedures, schedules and coordination with other work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in original, factory-sealed, unopened containers bearing manufacturer's name and label intact and legible with following information.
 - 1. Name of material.
 - 2. Manufacturer's stock number and date of manufacture.
- B. Store materials in protected and well ventilated area. Handle materials to avoid damage.

1.7 PROJECT CONDITIONS

- A. Do not apply when surface temperature or weather conditions conflict with manufacturer's published requirements.
- B. Coordinate waterproofing work with other trades.
- C. Keep flammable products away from spark or flame. Do not allow the use of spark producing equipment during application and until all vapors have dissipated. Post "NO SMOKING" signs.
- D. Maintain work area in a neat and orderly condition, removing empty containers, rags, and rubbish daily from the site.

1.8 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.9 WARRANTY

- A. Warranty: Provide manufacturer's standard limited material warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Substitutions: See instructions on the Drawing Set.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Before work is started, applicator shall thoroughly examine all surfaces for any deficiencies.
- B. Notify Architect in writing of any defects.

3.2 SURFACE PREPARATION

- A. Surface should be free of oil, grease, dirt, laitance and loose material.
- B. Repair all cracks and holes as recommended by Manufacturer, before applying surface coating.

3.3 APPLICATION

- A. Comply with manufacturer recommendations and approved submittals. Mix as recommended by manufacturer.
- B. For fabric reinforced applications, apply first coat. Apply reinforcing fabric over the wet coating, overlapping all edges. Smooth out all wrinkles, to ensure there is no trapped air beneath fabric. Apply second coat.

END OF SECTION

SECTION 08 14 00
INTERIOR WOOD DOORS

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PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Interior wood doors of the following types:
 - 1. Contemporary doors.

1.2 RELATED WORK

- A. Section 06 10 00 - Rough Carpentry.

1.3 REFERENCES

- A. American with Disabilities Act (ADA).
- B. National Fire Protection Association (NFPA): NFPA 80 - Standard for Fire Doors and Other Opening Protectives.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Indicate locations of blocking and reinforcements required for installing wood doors.
- C. Verification Samples: For each finish product specified, two samples, representing actual product, color, and finish.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- E. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic checking and adjustment, cleaning and maintenance of wood doors.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum five years experience in manufacturing wood doors.
- B. Installer: Experienced with installation of similar products, and acceptable to the manufacturer.
- C. Mock-Up: Provide a mock-up for evaluation of fabrication techniques and application workmanship.
 - 1. Install in areas designated by Architect.
 - 2. Do not proceed with remaining work until installation is approved by Architect.
 - 3. Rebuild mock-up until satisfactory results are achieved.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in the manufacturer's unopened packaging until ready for installation.
- B. Protect finished surfaces from soiling or damage during handling and installation.

1.7 PROJECT CONDITIONS

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

1.8 WARRANTY

- A. Manufacturer's Warranty: Provide manufacturer's standard limited warranty for materials.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Acceptable Manufacturer:
- B. Substitutions: See Drawing instructions. .
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 INTERIOR WOOD DOORS

- A. Contemporary Doors:
 - 1. Custom, refer to the Drawings.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Do not begin installation until substrates have been properly prepared.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 INSTALLATION

- A. Install products in strict accordance with manufacturer's instructions and approved submittals.
 - 1. Follow manufacturer's recommendations for attachment.
 - 2. Adjust to open and close smoothly and freely without binding.

3.3 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

DIVISION 9 - FINISHES

SECTION 09 30 00 - TILING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Glazed Wall Tile.
- B. Ceramic Mosaic Tile.
- C. Paver Tile.
- D. Quarry Tile.
- E. Glass Mosaic Tile.
- F. Glass Tile.
- G. Waterproofing.
- H. Crack Isolation.
- I. Stone thresholds.
- J. Ceramic accessories.
- K. Ceramic trim.
- L. Non-ceramic trim.

1.2 RELATED SECTIONS

- A. Section 03 35 05 - Self-Leveling Underlayment.
- B. Section 07 92 00 - Joint Sealant.

1.3 REFERENCES

- A. ANSI A108.1A, 1999 - Specifications for Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar.
- B. ANSI A108.1B, 1999 - Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar.

- C. ANSI A108.1C, 1999 - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar -or- Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar.
- D. ANSI A108.4, 1999 - Specifications for Ceramic Tile Installed with Organic Adhesives or Water-Cleanable Tile Setting Epoxy Adhesive.
- E. ANSI A108.5, 1999 - Specifications for Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
- F. ANSI A108.6, 1999 - Specifications for Ceramic Tile Installed with Chemical-Resistant, Water-Cleanable Tile-Setting and -Grouting Epoxy.
- G. ANSI A108.8, 1999 - Specifications for Ceramic Tile Installed with Chemical-Resistant Furan Mortar and Grout.
- H. ANSI A108.9, 1999 - Specifications for Ceramic Tile Installed with Modified Epoxy Emulsion Mortar/Grout.
- I. ANSI A108.10, 1999 - Specifications for Installation of Grout in Tilework.
- J. ANSI A118.1, 1999 - Standard Specification for Dry-Set Portland Cement Mortar.
- K. ANSI A118.3, 1999 - Chemical-Resistant, Water-Cleanable, Tile-Setting and -Grouting Epoxy and Water-Cleanable Tile-Setting Epoxy Adhesive.
- L. ANSI A118.4, 1999 - Latex-Portland Cement Mortar.
- M. ANSI A118.5, 1999 - Chemical-Resistant Furan Mortar and Grout.
- N. ANSI A118.6, 1999 - Standard Ceramic Tile Grouts.
- O. ANSI A118.7, 1999 - Polymer Modified Cement Grouts
- P. ANSI A118.8, 1999 - Modified Epoxy Emulsion Mortar/Grout.
- Q. ANSI A118.9, 1999 - Test Methods and Specifications for Cementitious Backer Units

- R. ANSI A118.10, 1999 - Load bearing, Bonded, Waterproof Membranes for Thinset Ceramic Tile and Dimensional Stone.
- S. ANSI A118.11, 1999 - Exterior Grade Plywood (EGP) Latex-Portland Cement Mortar.
- T. ANSI A136.1, 1999 - Organic Adhesives for Installation of Ceramic Tile.
- U. ANSI A137.1, 1988 - Specifications for Ceramic Tile.
- V. ASTM C50 - Standard Specification for Portland Cement.
- W. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
- X. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
- Y. ASTM C241 - Test Method For Abrasion Resistance of Stone Subjected to Foot Traffic.
- Z. ASMT C503 - Specification for Marble Building Stone (Exterior).
- AA. ASTM C615 - Specification for Granite Dimension Stone.
- BB. ASTM C629 - Specification for Slate Dimension Stone.
- CC. ASTM C847 - Standard Specification for Metal Lath.
- DD. ASTM C1028 - Test method for Determining the Static Coefficient of Friction or Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull meter Method.
- EE. ASTM D4397 - Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications.
- FF. TCA (HB) - Handbook for Ceramic Tile Installation; Tile Council of America, Inc.

1.4 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: Tile on walkway surfaces shall be provided with the following values as determined by testing in conformance with ASTM C 1028.
 - 1. Level Surfaces: Minimum of 0.6 (Wet).

2. Step Treads: Minimum of 0.6 (Wet).
3. Ramp Surfaces: Minimum of 0.8 (Wet).

1.5 SUBMITTALS

- A. Submit under provisions of Section 01 30 00.
- B. Manufacturer's data sheets on each product to be used, including:
 1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.
- C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
- D. Selection Samples: Color charts illustrating full range of colors and patterns.
- E. Selection Samples: Samples of actual tiles for selection.
- F. Samples: Mount tile and apply grout on two plywood panels, 36 by 36 inch in size illustrating pattern, color variations, and grout joint size variations.
- G. Manufacturer's Certificate:
 1. Certify that products meet or exceed specified requirements.
 2. For each shipment, type and composition of tile provide a Master Grade Certificate signed by the manufacturer and the installer certifying that products meet or exceed the specified requirements of ANSI A137.1.
- H. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.6 QUALITY ASSURANCE

- A. Maintain one copy each of all Referenced standards and specifications on site. Include the TCA Handbook, ANSI A108 Series, ANSI A118 Series ANSI A136.1 and ANSI A137.1 and others as specified under paragraph References.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 10 years experience.
- C. Single Source Responsibility:

1. Obtain each type and color of tile from a single source.
2. Obtain each type and color of mortar, adhesive and grout from the same source.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging until ready for installation.
- B. Protect adhesives and liquid additives from freezing or overheating in accordance with manufacturer's instructions.
- C. Store tile and setting materials on elevated platforms, under cover and in a dry location and protect from contamination, dampness, freezing or overheating.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not install adhesives in an unventilated environment.
- B. Maintain ambient and substrate temperature of 50 degrees F (10 degrees C) during installation of mortar materials.

1.9 EXTRA MATERIALS

- A. Provide 200 sq ft of each size, color, and surface finish of tile specified.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: As shown on drawings.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

2.2 TILE

- A. General: Provide tile that complies with ANSI A137.1 for types, compositions and other characteristics indicated. Provide tile in the locations and of the types colors and pattern indicated on the Drawings and identified in the Schedule and the end of this Section. Tile shall also be provided in accordance with the following:

1. Factory Blending: For tile exhibiting color variations within the ranges selected under Submittal of samples, blend tile in the factory and package so tile taken from one package shows the same range of colors as those taken from other packages.
2. Mounting: For factory mounted tile, provide back or edge mounted tile assemblies as standard with the manufacturer, unless otherwise specified.
3. Factory Applied Temporary Protective Coatings: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with a continuous film of petroleum paraffin wax applied hot. Do not coat unexposed tile surfaces.

2.3 SETTING MATERIALS

- A. Organic Adhesive: ANSI A136.1, thinset bond type; use Type I in areas subject to prolonged moisture exposure.
- B. Epoxy Adhesive: ANSI A118.3, thinset bond type.
- C. Mortar Bed Materials:
 1. Portland cement: ASTM C150, type 1, gray or white.
 2. Hydrated Lime: ASTM C207, Type S.
 3. Sand: ASTM C144, fine.
 4. Latex additive: As approved.
 5. Water: Clean and potable.
- D. Mortar Bond Coat Materials:
 1. Dry-Set Portland Cement type: ANSI A118.1.
 2. Latex-Portland Cement type: ANSI A118.4.
 3. Epoxy: ANSI A118.3, 100 percent solids.
- E. Standard Grout: Cement grout, sanded or unsanded, as specified in ANSI A118.6; color as selected.
- F. Polymer modified cement grout, sanded or unsanded, as specified in ANSI A118.7; color as selected.
- G. Epoxy Grout: ANSI A118.8, 100 percent solids epoxy grout; color as selected.
- H. Silicone Sealant: Silicone sealant, moisture and mildew resistant type, white; use for shower floors and shower walls.
- I. Cleavage Membrane:

1. No. 15 (6.9 kg) asphalt saturated felt, ASTM D226, Type 1.
 2. Polyethylene film, ASTM D4397, 4.0 mil thickness.
- J. Waterproofing Membrane at Floors: Membrane in accordance with ANSI A118.10 and as follows:
1. Chlorinated Polyethylene Sheet with polyester fabric reinforcing.
 2. Fabric Reinforced, Fluid-Applied elastomeric membrane.
 3. Un-Reinforced, Fluid-Applied elastomeric membrane.
 4. Polyethylene Sheet Product..
 5. Fabric-Reinforced, Modified-Bituminous Sheet Product.
 6. Urethane Waterproofing and Tile-Setting Adhesive Product.
- K. Membrane at Walls: No. 15 (6.9 kg) asphalt saturated felt, ASTM D226, Type 1.
- L. Membrane at Walls: 4 mil (0.1 mm) thick polyethylene film, ASTM D4397.
- M. Membrane at Walls: Reinforced asphalt paper.
- N. Reinforcing Mesh: 2 by 2 inch (50 by 50 mm) size weave of 16/16 wire size; welded fabric, galvanized.
- O. Metal Lath: ASTM C847, Flat expanded diamond mesh, not less than 2.5 lbs/SY, galvanized finish.
- P. Cementitious Backer Board: ANSI A118.9; High density, cementitious, glass fiber reinforced with 2 inch (50 mm) wide coated glass fiber tape for joints and corners:
1. Thickness: 1/4 inch (6 mm).
 2. Thickness: 1/2 inch (13 mm).
 3. Thickness: 5/8 inch (16 mm).

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that wall surfaces are free of substances which would impair bonding of setting materials, smooth and flat within tolerances specified in ANSI A137.1, and are ready to receive tile.
- B. Verify that sub-floor surfaces are dust-free, and free of substances which would impair bonding of setting materials to sub-floor surfaces,

and are smooth and flat within tolerances specified in ANSI A137.1.

- C. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

- A. Protect surrounding work from damage.
- B. Remove any curing compounds or other contaminants.
- C. Vacuum clean surfaces and damp clean.
- D. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- E. Install cementitious backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of dry-set mortar to a feather edge.
- F. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.3 INSTALLATION - GENERAL

- A. Install tile and grout in accordance with applicable requirements of ANSI A108.1 through A108.13, manufacturer's instructions, and TCA Handbook recommendations.
- B. Lay tile to pattern indicated. Arrange pattern so that a full tile or joint is centered on each wall and that no tile less than 1/2 width is used. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
- E. Form internal angles square and external angles bullnosed.

- F. Install ceramic accessories rigidly in prepared openings.
- G. Install non-ceramic trim in accordance with manufacturer's instructions.
- H. Install thresholds where indicated.
- I. Sound tile after setting. Replace hollow sounding units.
- J. Keep expansion joints free of adhesive or grout. Apply sealant to joints.
- K. Allow tile to set for a minimum of 48 hours prior to grouting.
- L. Grout tile joints. Use standard grout unless otherwise indicated.
- M. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.4 INSTALLATION - FLOORS - THIN-SET METHODS

- A. Over exterior concrete substrates, install in accordance with TCA Handbook Method F102, with standard grout.
- B. Over interior concrete substrates, install in accordance with TCA Handbook Method F113, dry-set or latex-portland cement bond coat, with standard grout, unless otherwise indicated.
 - 1. Where waterproofing membrane is indicated, install in accordance with TCA Handbook Method F122, with latex-portland cement grout.
 - 2. Where epoxy bond coat and grout are indicated, install in accordance with TCA Handbook Method F131.
- C. Over wood substrates, install in accordance with TCA Handbook Method F142, with standard grout, unless otherwise indicated.
 - 1. Where epoxy bond coat and grout are indicated, install in accordance with TCA Handbook Method F143.

3.5 INSTALLATION - FLOORS - MORTAR BED METHODS

- A. Over exterior concrete substrates, install in accordance with TCA F101, bonded, with standard grout.
- B. Over interior concrete substrates, install in accordance with TCA Handbook Method F111, with cleavage membrane, unless otherwise indicated.

1. Where waterproofing membrane is indicated, with standard grout or no mention of grout type, install in accordance with TCA Handbook Method F121.
 2. Where epoxy bond coat and grout are indicated, install in accordance with TCA Handbook Method F132, bonded.
 3. Where epoxy or furan grout is indicated, but not epoxy or furan bond coat, install in accordance with TCA Handbook Method F114, with cleavage membrane.
- C. Over wood substrates, install in accordance with TCA Handbook method F141, with standard grout, unless otherwise indicated.
- D. Cleavage Membrane: Lap edges and ends.
- E. Waterproofing Membrane: Install as specified in ANSI A108.13.
- F. Mortar Bed Thickness: 1-1/4 to 2 inch (32 to 51 mm) maximum, unless otherwise indicated.

3.6 INSTALLATION - SHOWERS AND BATHTUB WALLS

- A. At tiled shower receptors install in accordance with TCA Handbook Method B415, mortar bed floor, and W244, thin-set over cementitious backer unit walls.
- B. At bathtub walls install in accordance with TCA Handbook Method B412, over cementitious backer units with waterproofing membrane.
- C. Grout with standard grout as specified above.
- D. Seal joints between tile work and other work with sealant specified in Section 07 92 00.

3.7 INSTALLATION - WALL TILE

- A. Over cementitious backer units on studs, install in accordance with TCA Handbook Method W244, using membrane at toilet rooms.
- B. Over cementitious backer units install in accordance with TCA Handbook Method W223, organic adhesive.
- C. Over gypsum wallboard on wood or metal studs install in accordance with TCA Handbook Method W243, thin-set with dry-set or latex-portland cement bond coat, unless otherwise indicated.
1. Where mortar bed is indicated, install in accordance with TCA Handbook Method W222, one coat method.

- 2. Where waterproofing membrane is indicated other than at showers and bathtub walls, install in accordance with TCA Handbook Method W222, one coat method.
 - D. Over interior concrete and masonry install in accordance with TCA Handbook Method W202, thin-set with dry-set or latex-portland cement bond coat.
 - E. Over wood studs without backer install in accordance with TCA Handbook Method W231, mortar bed, with membrane where indicated.
 - F. Over metal studs without backer install in accordance with TCA Handbook Method W241, mortar bed, with membrane where indicated.
- 3.8 CLEANING
- A. Clean tile and grout surfaces.
- 3.9 PROTECTION OF FINISHED WORK
- A. Do not permit traffic over finished floor surface for 72 hours after installation.
 - B. Cover floors with kraft paper and protect from dirt and residue from other trades.
 - C. Where floor will be exposed for prolonged periods cover with plywood or other similar type walkways

END OF SECTION

DIVISION 9 - FINISHES

SECTION 09 91 00 – PAINTING

1. GENERAL

The work in this Section shall be performed in accordance with the General Conditions of the Contract, which are made a part hereof by reference.

2. SCOPE OF THE WORK

Includes the painting work specified in the drawings.

It is the intention to describe all painting work required, with the exception of the excluded work indicated below, and the Contractor shall so execute all required painting work, regardless of whether such work may be indicated on the drawings or schedule of finishes.

3. SUBMITTALS

- a. Submit for preliminary approval of the Architect samples of all colors, and sample panels of metal and wood finishes made on materials of the same kind as those used in the building.
- b. After preliminary approval of samples and colors, prepare sample as indicated on the drawings for Architect's final approval before proceeding with work.
- c. All work shall be executed in strict accordance with approved sample panels.

4. PRODUCT DELIVERY, HANDLING AND STORAGE

Materials shall be delivered to the job site in unopened containers which shall show the designated name, formula or specifications, color, manufacturer's directions, and name of manufacturer, all of which shall be plainly legible at time of use. Pigmented paints shall be furnished in containers not larger than 5 gallons. Materials listed without reference to a particular product and not further described hereinafter shall be products which have had a minimum of two (2) years satisfactory field service.

Laboratory tests simulating field conditions will not be accepted in lieu of actual fields results.

All materials used on the job shall be stored in a single place as designed. Such storage place shall be kept clean and all damage to it or its surroundings shall be repaired. Any oily rags, waste, etc., must be removed from the building every night and every precaution taken to avoid the danger of fire.

5. MATERIALS

- a. All paints and plasteres shall be as specified on the Drawings.
 - 1) Fillers, sealers, primers and undercoaters - shall be as recommended for optimum results by the manufacturer of the paint used.
- b. The above list is intended to present a general idea of the materials required, but is not to be interpreted as necessarily complete or exact. Before proceeding with the painting work the Contractor shall prepare and submit for approval by the Architect, a paint schedule showing the paints he proposes to use in each area to be finished. No painting work shall be done until this schedule has been finally approved.
- c. Primers and undercoats shall be by the same manufacturer as the finish coat, and as approval.
- d. Color pigments shall be color stable to sunlight and atmosphere, finely ground.

6. EXECUTION

- a. Before starting any work, surfaces to receive paint finishes shall be examined carefully for defects which cannot be corrected by the procedures specified herein and which might prevent satisfactory painting results. Work shall not proceed until such damages are corrected. The commencing of work in a specific area shall be construed as acceptance of the surfaces, and thereafter the Contractor shall be fully responsible for satisfactory work as required herein.
- b. Before painting is started in any area, broom clean and remove excessive dust.

- c. After painting operation begin in a given area, broom cleaning will not be allowed; cleaning shall then be done only with commercial vacuum cleaning equipments.
- d. Adequate illumination shall be provided in all areas where painting operations are in progress.
- e. Only skilled workers shall be employed. Application may be by brush, roller or spray, as approved by owner and the architect.
- f. Remove and protect hardware, accessories, device plates, lighting fixtures, factory finished work, and similar items, or provide ample in-place protection. Upon completion of each space, carefully replace all removed item.
- g. Remove electrical panel box cover and doors before painting walls. Paint separately and reinstall after all paint is dry.
- h. All materials shall be evenly spread and flowed-on smoothly to avoid runs, sags, holidays, brush marks, air bubbles and excessive roller stipple.
- i. Coverage and hide shall be complete. When color, stain, dirt or undercoats show through final coat of paint, the surface shall be covered by additional coats until the paint film is of uniform finish, color, appearance and coverage, at no additional cost to the owner.
- j. All coats shall be dry to manufacturer's recommendations before applying succeeding coats.
- k. All suction spots or "hot spots" in plaster and/or cement after the application of the first coat shall be touched up before +

7. PREPARATION OF SURFACES

a. General

- 1) Surfaces shall be clean, dry and adequately protected from dampness.
- 2) Surface shall be free of any foreign materials which will adversely affect adhesion or appearance of applied coating.

- 3) Mildew shall be removed and the surface neutralized per the coating manufacturer's recommendations.
- 4) Efflorescence on any area will be corrected before painting.

b. Concrete, Masonry and Stucco

- 1) Patch large openings and holes and finish flush with adjacent surface. After priming, fill any remaining small holes with prepared patching material.
- 2) Masonry and concrete surface shall be cleaned until free of all loose and foreign materials and excess mortar, using metal scrapers and wire brushes if necessary. Grease and oil spots shall be removed by suitable cleaning compound and then rinsed with clean water to remove all traces of Alkali. Efflorescence (Alkali salts) shall be removed. Treated surfaces shall be allowed to dry thoroughly before any paint is applied.

f. Existing Surfaces to be Repainted

Where existing work is cut, patched, or added to, all surfaces shall be painted or touched up to match present work as closely as possible. Existing work, where scheduled for repainting, shall be put in condition to provide good adhesion and to receive paint.

9. COATING

- a. Unless otherwise specifically so directed in writing by the architect, all paints and finishes shall be applied in strict accordance with manufacturer's printed instructions.
- b. All paints shall be applied to the dry and wet mil thickness as recommended by the paint manufacturer and/or specified herein.

8. WORKMANSHIP

Each coat of paint and enamel shall be evenly worked out and allowed to become dry before any subsequent coat is applied or rubbing done, and shall be a different tint from that of the preceding coat. Finish coats shall

be the exact shades selected. The finished work shall be free from runs and sags, detective coverage and clogging of lines and angles. Edges of paint adjoining other material or other colors shall be full and clean-cut without overlapping.

9. CLEAN UP

- a. Upon termination of painting work the Contractor shall remove all masking materials, tools, scaffolding surplus materials from the premises and leave area clean for the work of other trades or for the uses intended.
- b. Contractor should clean off all misplaced paint, spots and spills.

END OF SECTION

SECTION 09 94 10

FIELD PAINTING

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Furnish and apply required paints and coatings. Prepare, clean, and finish all surfaces specified, scheduled or otherwise indicated to be field painted.
 - 1. The terms "paint" and "coating" used herein include emulsions, enamels, paints, stains, varnishes, sealers, and other coatings, organic or inorganic, whether used as intermediate, or finish coats.
- B. Complete painting in accordance with Specifications, and paint manufacturer's current surface preparation and application instructions.

1.02 RELATED WORK:

- A. Manufacturer's standard prime paint finishes are specified under the applicable Sections for Architectural.

1.03 SUBMITTALS:

- A. To aid in determining coating compatibility, submit following:
 - 1. List of coating products proposed, giving brand, type and manufacturer.
 - 2. Manufacturer's current printed recommendations and product data sheets for each.
 - 3. Field painting applicator's correspondence for determining compatibility of field coatings with primers and for selecting manufacturer producing field coats.
- B. Submit color chips of materials proposed, and sample panels of paints and coatings selected. Make samples not less than 12-in. square, on sheet metal for metal coatings, on cement asbestos board for masonry and concrete coatings.
- C. Submit Manufacturer's certificates and test reports for the following materials:
 - 1. List materials

1.05 PAINT STORAGE AND MIXING AREAS, AND WASTE DISPOSAL:

- A. Store paints and painter's materials only in area or areas designated solely for this purpose. Confine mixing, thinning, clean-up and associated operations, and storage of painting debris before authorized disposal, to these areas.

- B. Do not use plumbing fixtures, piping or mechanical equipment for mixing or disposal of paint materials.
 - 1. Transport water to paint area by approved temporary hose or piping.
 - 2. Store waste temporarily in closed, nonflammable containers until final disposal. Keep no rubbish in painter's area longer than 24 hours. Finally dispose of waste in an approved disposal system outside of buildings.

1.06 DELIVERY, HANDLING, STORAGE, PROTECTION:

- A. Deliver materials to painter's area in original, unbroken, containers with name and analysis of product, manufacturer's name, and shelf life date. Do not use or retain contaminated, outdated, prematurely opened, or diluted materials.
- B. Store coated items carefully. Avoid damaging or dirtying coatings, by contact with soil, pavement or other harmful contacts which might necessitate special cleaning. Use suitable blocking during storage.
- C. Do not expose primed surfaces to weather for more than six months before top coating. Allow less open time if recommended by coating manufacturer.
- D. During surface preparation, cleaning and painting operations, protect all surfaces not to be painted.
- E. Protect coated items, whether prime or finish, from damage due to shipping and handling. For items with type E or S service coatings; use padding, blocking, fabric slings and extra care.
- F. Upon completion of field painting, ensure coatings undamaged and in good condition. Make good damage or coating deterioration resulting from failure to observe foregoing requirements.

1.07 JOB CONDITIONS:

- A. Environmental Requirements:
 - 1. Comply with manufacturer's recommendations as to environmental conditions under which coatings and coating systems can be applied.
 - 2. Do not apply coatings when dust is being generated.
- B. Protection:
 - 1. Cover or otherwise protect finish work of other trades and surfaces not being painted concurrently or not to be painted.

PART 2 - PRODUCTS

2.01 MATERIALS; GENERAL:

- A. Paint Coatings: Suitable for intended use, recommended by their manufacturer for intended service.
- B. Products Used: Minimum of five years satisfactory use under similar service conditions.
- C. Use products of one manufacturer in any one paint coating system; all coating materials compatible. Coatings for touch-up; same as original.

2.02 **COLORS AND FINISHES:**

- A. All finish colors as selected from manufacturer's color chips. Color schedule will indicate colors to be used. Match final colors to selected color chips, as scheduled.
- C. To provide contrast between successive coats, lightly tint each coat to distinguish it from preceding coats.
- D. Unless otherwise indicated, for finish paint use gloss or semigloss on wood and metal, and matte finish or flat on masonry and concrete.

PART 3 - EXECUTION

3.01 **INSPECTION:**

- A. Examine surfaces scheduled to receive paint and finishes for conditions that will adversely affect execution, permanence or quality of work and which cannot be put into an acceptable condition through preparatory work.
- B. Do not proceed with surface preparation or coating application until conditions are suitable.

3.02 **PREPARATION:**

A. **Basic Steps:**

- 1. Coordinate cleaning and painting operations to eliminate contamination of one by the other.
- 2. Maintain all coating materials at manufacturer's recommended mixing and application temperatures for not less than 24 hours before use. Have clean, proper containers, spray equipment, applicators and accessory items ready for use before decanting or mixing paint materials.
- 3. Ensure proper coordination of materials to be applied hereunder with previous coatings on affected surfaces. Have all manufacturer's written directions on hand, and follow them strictly, except where otherwise specified.

B. PAINT REMOVAL:

- 1. Coordinate cleaning and painting operations to eliminate contamination of one by the other.
- 2. Paint must be removed from cracked finishes before surface preparation. Removal methods are limited to:
 - Scrapping
 - vapor removal
 - heat gun removal
- C. Before any paint application, carefully clean all surfaces to be coated of dust, dirt, grease, loose rust, mill scale, paint unsuitable for top coating, efflorescence, oil, moisture, foreign matter or conditions detrimental to coating bond and durability.
 - 1. Following cleaning, apply preparatory treatment in strict accordance with manufacturer's written instructions.

2. Fill imperfections and holes in surfaces to be painted.

3.03 TOUCH-UP:

- A. Before applying field coat, touch-up abraded areas of shop coats with paint of the same type. Apply an entire coat if necessary. Touch-up coats are in addition to, and not a substitute for first field coat. Clean deteriorated surfaces to bare wood before applying touch-up coat.

3.04 APPLICATION:

- A. In general, apply minimum of one under coat and one finish coat to all previously primed surfaces. Following careful inspection of surfaces not previously primed, prepare and clean as specified, apply proper prime coat and minimum of one under coat and one finish coat. Refer to Paint Schedule at end of section.

B. Conditions:

1. Do not apply paints or other finish to wet or damp surfaces, except in accordance with instructions of manufacturer. Do not apply exterior paint during cold, rainy, or frosty weather, or when temperature is likely to drop to freezing. Avoid painting of surfaces while they are exposed to the sun.
2. Paint surfaces which have been cleaned, pretreated, or otherwise prepared for painting with first field coat as soon as practicable after such preparation has been completed, but in any event prior to deterioration of prepared surface.

C. Methods:

1. Spraying with adequate apparatus may be substituted for brush application of suitable paints and in locations suitable for spraying.
2. Prepare surfaces, mix and apply paint materials in strict accordance with manufacturer's printed instructions and recommendations, except where specifically directed otherwise. Control temperature of materials upon mixing and application, surface temperature and condition, thinning and modifying.
3. Protect surfaces to be coated, before, during and after application unless ambient weather conditions are favorable.

D. Workmanship:

1. Spot prime with aluminum paints, all exposed nails and other ferrous metal on surfaces to be painted with water-thinned paints.
2. Apply coating materials to meet manufacturer's spreading rate and dry film thickness recommendations. Dry film thickness specified are constant for brush, spray, roller or other form of application.
 - a. Control thinning for spray use and to manufacturer's printed instructions, and produce specified dry film thickness on level surfaces, interior and exterior angles.

- b. Record quantities of materials of each type, for each coat, used in each location.
 - 3. Apply paints and coatings using skilled painters, brushed or rolled out carefully to a smooth, even coating without runs or sags. Flow enamel on evenly and smoothly. Allow each coat of paint to dry thoroughly, on the surface and throughout the film thickness, before the next coat is applied. High polymer coatings may be excepted from the drying requirement if recoat time is specified by manufacturer.
 - 4. Finish surfaces: Uniform in finishes and colors, and free from flash spots and brush marks.
 - 5. Accessory items, finish hardware, lighting fixtures, escutcheons, plates, trim and similar finish items not to be painted: Remove or carefully mask before painting adjacent surfaces. Carefully replace and reposition upon completion of adjacent painting and cleaning work.
- 3.05 PROTECTION, CLEAN-UP:
- A. Protect all materials and surfaces painted or coated under this section, both before and after application. Also protect all adjacent work and materials by the use of sufficient drop cloths during the progress of this work. Upon completion of the work, clean up all paint spots, oil, and stains from floors, glass, hardware, and similar finished items.
- 3.06 PAINT SCHEDULE:
- A. Coordinate, schedule and confirm the various cleaning, touch-up and finishing operations. Ensure the transmission of materials data, color selections and coating system methods between the coating applicators. Take responsibility for not exceeding exposure and recoat time limits.
- 3.07 FINAL TOUCH-UP:
- A. Prior to final completion and acceptance, examine painted and finished surfaces and retouch or refinish as necessary and required to leave surfaces in perfect condition.
 - B. After doors have been fitted and hung, refinish edges, tops and bottom.

END OF SECTION