



# Bainbridge Island

## Metro Park & Recreation District

### **PROJECT MANUAL**

**Project No. 20223**  
**Ray Williamson Pool Renovation, PHASE 2**

**January 30, 2026**

**VOLUME 2, DIVISIONS 02 - 33**  
**BID SET**

**STEMPER** ARCHITECTURE  
COLLABORATIVE

**Consultants:**  
**The Greenbusch Group Engineers**  
**TFWB Engineers**  
**MLA Engineering**  
**Jacobson Consulting Engineers**



**Bainbridge Island**  
Metro Park & Recreation District

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**PROJECT MANUAL, VOLUME 2  
TECHNICAL SPECIFICATIONS**

**PROJECT NO. 20223**

**RAY WILLIAMSON POOL IMPROVEMENTS  
PHASE 2**

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## PART 1 – GENERAL

### 1.01 SUMMARY

- A. Section includes:
  - 1. Deconstruction and removal of selected portions of the building(s) or structure for reuse as identified in the construction documents.
  - 2. Demolition and removal of selected portions of the building or structure for disposal as identified for demolition in the construction documents.
  - 3. Salvage of building materials and equipment as identified in the construction documents.
  - 4. Surplus of building materials and equipment as identified in the construction documents.
- B. Related Sections:
  - 1. Section 01 11 00 – Summary of Work
  - 2. Section 01 74 19 - Construction Waste Management and Disposal
  - 3. Section 01 76 00 – Protection of Existing Facilities

### 1.02 DEFINITIONS

- A. Full Deconstruction: Removal by disassembly of a building in the reverse order in which it was constructed.
- B. Selective Deconstruction: Disassembly and removal of selected portions of building or structure.
- C. Salvage: Removal of disassembled building materials for the purpose of reuse or recycling.
- D. Demolish: Remove and legally dispose of off-site.
- E. Surplus: Remove and return item(s) to Owner. Coordinate surplus item storage with Owner.

### 1.03 REGULATORY REQUIREMENTS

- A. Conform to applicable Federal, State and Anchorage code for demolition work, safety of structure, occupants and pedestrians, and dust control.
- B. Obtain required permits from authorities.
- C. Notify affected utility companies before starting work and comply with their requirements.
- D. Do not close or obstruct egress width to exits.
- E. Do not disable or disrupt building fire or life safety systems without 3-day prior written notice to the Owner.
- F. Conform to procedures applicable when discovering hazardous or contaminated materials.

1.04 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, deconstruction waste becomes property of the Contractor.

1.05 SEQUENCING

- A. Sequence work under the provisions of Division 01 for Summary of Work.

1.06 SCHEDULE

- A. Perform noisy work to the hours permitted by local governing noise ordinances and the Owner.
- B. Schedule work to comply with requirements of Division 01

1.07 SUBMITTALS

- A. Qualification Data: For deconstruction firm.
- B. Schedule of Deconstruction Activities: Indicate the following:
  - 1. Detailed sequence of deconstruction and removal work, with starting and ending dates for each activity.
  - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
  - 3. Coordination for shutoff, capping, and continuation of utility services.
  - 4. Use of elevator and stairs.
  - 5. Locations of proposed dust- and noise-control temporary partitions and means of egress.
  - 6. Means of protection for items to remain and items in path of material removal from building.
- C. Inventory: After deconstruction is complete, submit a list of items that have been salvaged, recycled and disposed of and documentation (receipts/scale tickets/waybills) showing the quantities.
- D. Deconstruction Photographic Documentation: Document general condition of materials to be salvaged prior to removal.
- E. Submit deconstruction plan prior to start of work.

1.08 QUALITY ASSURANCE

- A. Deconstruction Firm Qualifications: Company(ies) experienced and specializing in performing the Work of this Section with a minimum of two years and/or a minimum of five projects of documented experience in similar types of deconstruction work.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

1. Comply with noise and dust regulations of authorities having jurisdiction.
- C. Pre-Deconstruction Conference: Conduct conference at Project site. Review methods and procedures related to deconstruction including, but not limited to, the following:
  1. Inspect and discuss condition of building to be deconstructed.
  2. Review structural load limitations of existing structure.
  3. Review and finalize deconstruction schedule and verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
  4. Review requirements of work performed by other trades that rely on substrates exposed by deconstruction operations.
  5. Review areas where existing construction is to remain and requires protection.
  6. Review method for removing materials from the site.
  7. Review staging area for materials on the site.

#### 1.09 PROJECT CONDITIONS

- A. Hazardous Materials: It is unknown whether hazardous materials will be encountered in the Work.
  1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Consultant and the Owner. The Owner will remove hazardous materials under a separate contract.
- B. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during deconstruction operations.
  1. Maintain fire-protection facilities in service during deconstruction operations.

#### 1.10 DECONSTRUCTION PLAN

- A. Material Identification: Indicate anticipated types and quantities of materials to be salvaged, recycled, and disposed of. Indicate quantities by weight or volume, but use same units of measure throughout.
- B. Procedure: Describe deconstruction methodology, sequencing, and materials handling and removal procedures. Include the anticipated final destination of each material.

#### PART 2 – PRODUCTS (Not Used)

#### PART 3 – EXECUTION

##### 3.01 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of deconstruction required.
- C. Inventory and record the condition of items to be removed and salvaged.

- D. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or videotapes.

### 3.02 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS:

- A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during deconstruction operations.
- B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems.

### 3.03 PREPARATION

- A. Site Access and Temporary Controls: Conduct deconstruction operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to workers.
  - 1. Provide protection to ensure safe passage of workers around deconstruction area.
  - 2. Provide weather protection for all salvage materials (and items to remain) before, during and after deconstruction.
- C. Protect existing materials, which are not to be demolished.
- D. Prevent movement of remaining structure. Provide bracing propping, and shoring.
- E. Mark location of utilities.

### 3.04 DECONSTRUCTION

- A. General: Deconstruct and remove existing construction in accordance with the materials identified for removal in the deconstruction plan. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Proceed with deconstruction systematically, from higher to lower level. Complete deconstruction operations above each floor or tier before disturbing supporting members on the next lower level.
  - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing, prying or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
  - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.

5. Maintain adequate ventilation when using cutting torches.
  6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site in accordance with all federal, state and local regulations.
  7. Remove structural framing members in such a way as to maintain their highest value.
  8. Locate deconstruction equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  9. Dispose of demolished items and materials promptly.
- B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during deconstruction activities. When permitted by Engineer, items may be removed to a suitable, protected storage location during deconstruction and cleaned and reinstalled in their original locations after deconstruction operations are complete.

### 3.05 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, remove demolished materials from Project site and legally dispose of them.
1. Do not allow demolished materials to accumulate on-site.
  2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
  3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
  4. Comply with requirements specified in Division 01 for Waste Management & Disposal.
- B. Burning: Do not burn demolished materials.

### 3.06 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by deconstruction operations. Return adjacent areas to condition existing before deconstruction operations began.
- B. Any damage caused by demolition to the remaining or neighboring buildings, or on-site streets and public right-of-way shall be repaired.

### 3.07 SALVAGED MATERIALS FOR REUSE BY OWNER SCHEDULE

- A. Salvage and reuse items as noted on the drawing documents.

END OF SECTION

## PART 1 – GENERAL

### 1.01 SCOPE

- A. This section covers the removal and disposal, or other impact, of asbestos-containing materials (ACMs) as necessary to accomplish the Work as defined by these Specifications. See Section 01 11 10, Summary of Hazardous Materials Work.
- B. Materials to be removed require confirmation in the field. Coordinate with the Environmental Consultant to properly record materials removed in each separate regulated work area.
- C. The Contractor shall refer to the Limited Hazardous Materials Survey Reports attached to these Specifications, which lists suspect materials in the areas of the Work. The Contractor shall ensure that copies of these reports are made available to and retained on the project site by all subcontractors.

### 1.02 RELATED WORK:

- A. Work performed under this specification section shall be governed by all related specification sections, including, but not limited to, the following:
  - 1. Division 00 - Procurement and Contracting Requirements;
  - 2. Division 01 - General Requirements; Section 01 11 10 Summary of Hazardous Materials Work

### 1.03 DEFINITIONS

- A. Authorized Visitor: The Owner or designated representative, or a representative of any regulatory or other agency having jurisdiction over the project, and having required training, medical, fit test, etc.
- B. Environmental Consultant: Environmental consultant specializing in asbestos abatement -- PBS Environmental -- or any subcontractor designated by PBS.
- C. Independent Testing Laboratory: A laboratory financially independent from and hired by the Owner or Contractor which is either AIHA-accredited for asbestos with demonstrated proficiency via the AIHA PAT program or has analysts proficient in the AIHA AAR program for air sample analysis.
- D. Owner: Representatives designated by the Owner, or designated employees of the Owner.
- E. Work Area: A regulated area where asbestos abatement activities are performed; isolated from non-work areas by negative pressure, containment barriers, decontamination enclosure systems and warning signs or demarcation tape with warning signs.

### 1.04 DOCUMENTS INCORPORATED BY REFERENCE

- A. The current issue of each document shall govern. Where conflict among requirements or with these Specifications exists, the most stringent requirements shall apply.
- B. U.S. Environmental Protection Agency National Emissions Standards for Hazardous Air Pollutants (NESHAPS). (Code of Federal Regulations Title 40, Part 61, Subparts A & B.)
- C. U.S. Environmental Protection Agency Office of Toxic Substances Guidance Document, *Guidance for Controlling Friable Asbestos-Containing Materials in Buildings*, EPA Report Number 560/5-85-024 ("Purple Book").
- D. U.S. Department of Labor Occupational Safety and Health Administration (OSHA):
  - 1. Title 29 Code of Federal Regulations Section 1910.1001--General Industry Standard For Asbestos.
  - 2. Title 29 Code of Federal Regulations Section 1910.134--General Industry Standard For Respiratory Protection.
  - 3. Title 29 Code of Federal Regulations Section 1910 *et al.*--Occupational Exposure to Asbestos; Final Rule.
  - 4. Title 29 Code of Federal Regulations 1926.1101--Construction Standard for Asbestos.
  - 5. Title 29 Code of Federal Regulations Section 1910.2--Access to Employee Exposure and Medical.
  - 6. Title 29 Code of Federal Regulations Section 1910.1200--Hazard Communication.
- E. Environmental Protection Agency 40 CFR Part 763, AHERA, Asbestos-Containing Materials in Schools; Final Rule and Notice.
- F. National Institute for Occupational Safety and Health (NIOSH), 30 CFR, Part II, Respirators.
- G. American National Standards Institute (ANSI) NY; ANSI Standard Z 88.2-1980 *American National Standards Practice for Respiratory Protection*, latest edition.
- H. CERCLA, Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. 9601 et.seq.).
- I. RCRA, Resource Conservation and Recovery Act.
- J. Washington State General Occupational Health Standards, WISHA Chapter 296-62 Washington Administrative Code (WAC); Chapter 296-65 WAC Asbestos Removal & Encapsulation; Chapter 296-155 WAC Safety Standards for Construction Work.
- K. Puget Sound Clean Air Agency Regulation III, Article 4 Asbestos Control Standard.
- L. Washington Industrial Safety and Health Act (WISHA).
- M. Uniform Building Code (U.B.C.), latest edition, and regulations as applicable.
- N. Perform all electrical work in accordance with the National Electrical Code.

- O. All local ordinances, regulations, or rules pertaining to asbestos, including its storage, transportation, and disposal.

#### 1.05 SUBMITTALS AND NOTICES

- A. No asbestos-related work will be permitted prior to submittals being processed by the Environmental Consultant. Allow fifteen (15) days for review prior to the commencement of abatement.
- B. Additional requirements for submittals are also described in other sections of these specifications. The requirements in this section pertain to asbestos-containing materials removal.
- C. Submit the "Contractor Acknowledgment of Asbestos Hazard Training, Respirator Training and Agreement to Undertake All Required Precautions", Form 028200-1 (attached to this Section). completed and signed by the Abatement Contractor in conjunction with pre-job submittals.
- D. Contractor shall submit to the Owner the following information prior to beginning work on the project:
  - 1. Work Plan: Include a detailed plan of the procedures proposed for use in complying with the requirements for each site, including the following:
    - a. A description of all special equipment, techniques, and methods to be used on the Project, including schematic drawings of work area layout(s) showing entries/exits, HEPA exhausts, decon units, and waste load-outs.
    - b. A specific clearance monitoring schedule indicating proposed start dates/times and completion dates/times for individual regulated areas as configured in the proposed Work Plan.
    - c. Specific information relating to handling, transport and disposal of asbestos-containing waste from each waste-generating site. Identify the designated proposed disposal site at which any waste material generated during the project will be disposed and furnish evidence of all necessary government approvals to dispose of the waste.
  - 2. Laboratory Qualification Information: Submit information pertaining to the proposed Air Monitoring Program for this project. Contractor's air monitoring shall include employee exposure monitoring. This information shall include the name(s) of personnel collecting air samples, types of equipment, sampling schedule, sampling procedures, calibration record keeping, name and address of proposed Independent Testing Laboratory, and evidence of analyst's NIOSH 582 course completion and AIHA PAT program participation.
  - 3. Worker Certification: Submit written proof that all employees performing asbestos-related work will have completed all necessary asbestos-related training in compliance with WAC Chapters 296-62 and 296-65. Written proof may be in the form of a notarized letter stating such intent and signed by an owner or principal of the appropriate firm(s).
  - 4. Written Certification: Submit written proof that all employees performing asbestos-related work will have completed all necessary asbestos-related training in compliance with WAC Chapters 296-62 and 296-65. Written proof may be in the

form of a notarized letter stating such intent and signed by an owner or principal of the appropriate firm(s).

5. Notifications and Policies: Submit copy of all required notifications and permits obtained by the contractor (Washington State Department of Labor and Industries, and PSCAA) and copies of all types of specified bonds and insurance. Submit upon receipt any approved amendments to notifications or re-notifications for multi-phase activities. See Paragraph 1.11 - Permits and Notifications for additional requirements.
6. Certified Asbestos Supervisor (CAS): Submit the name, Asbestos Supervisor Certification and resume of experience of the assigned on-site CAS. At a minimum, the foreman shall have successfully completed a supervisor-training course in compliance with WAC Chapter 296-65-007. References and work on similar projects will also be reviewed. The Owner and/or the General Contractor and Environmental Consultant reserve the right to remove the CAS from the work at any time during the project. The Contractor shall then submit another on-site CAS for approval as described above.

E. Daily Job Submittals

1. Personal Air Monitoring: Submit copies of all personal air monitoring data sheets, chain-of-custody and analytical results to the General Contractor and Environmental Consultant on a daily basis within 24 hours following sample collection.
2. Daily Logs: Submit copies of daily logs to the General Contractor and Environmental Consultant daily prior to the end of the next work shift. Daily logs shall indicate the date, time, site location, identity, company or agency represented, and reason for entry of all persons entering the work area, and the type, amount and location(s) of all ACMs removed.
3. Entry/Exit logs: Submit copies of regulated area entry/exit logs to the General Contractor and Environmental Consultant on a daily basis prior to the end of the next work shift

F. Periodic Submittals

1. Asbestos Training: Upon verbal request, immediately make available to the Environmental Consultant proof of Asbestos Worker Certification or Asbestos Supervisor Certification. Provide copies of worker training certification to the Owner upon request.
2. Work Plan modification/clarification: In the event that on-site activities will require departure from any and all aspects of the information outlined in the pre-approved Work Plan, submit written clarification/modification of proposed changes to the Owner and Environmental Consultant.

G. Post-Job Submittals shall be delivered to the General Contractor within 15-days of completion of asbestos-related work as specified by these Contract Documents and shall include the following:

1. Certifications: Provide written certification from the Abatement Contractor's Project Manager or Supervisor that Contractor has fully inspected the work area and completed work in strict accordance with the Specifications.
2. Air Monitoring: Submit documentation of all employee personal air monitoring results relative to OSHA and WISHA respiratory protection level compliance. Include

copies of all air monitoring data sheets, chain-of-custody documentation and analysis reports for sampling conducted at the site.

3. Project Record Documents: Provide project records including documentation of all contract changes, and copies of worksite entry logs, work area entry/exit logs, safety logs, safety meeting sign-in sheets, and supervisor's daily field reports.
4. Disposal Manifests: Submit copies of all asbestos waste transportation and disposal manifests including signed receipts from the landfill, and chain-of-custody.
5. Final payment will be issued by the Owner only with written approval, by the Environmental Consultant, of post-job submittals.

#### 1.06 PERSONNEL PROTECTION

- A. Training: All personnel accomplishing removal of asbestos-containing materials shall have received the minimum training as required by the Washington State Department of Labor and Industries for the work to be performed.
  1. At a minimum, the supervisor shall be the bearer of a current "Certified Asbestos Supervisor Certificate" issued by the Washington State Department of Labor and Industries. Prior to commencement of work, Contractor shall ensure all workers have been trained as specified in WAC Chapter 296-65.
  2. Prior to commencement of work, Contractor shall ensure all workers have been trained as specified in WAC Chapter 296-65.
  3. The Contractor shall provide and post decontamination, respirator, and work procedures for abatement crew.
- B. Personnel Protective Equipment for Asbestos Removal
  1. Provide protective clothing and equipment per WAC 296-62.

#### 1.07 AIR MONITORING BY CONTRACTOR:

- A. An Independent Testing Laboratory shall be retained by the Contractor for PCM sample analysis. All analysis shall be performed by an Industrial Hygienist. The Hygienist must be experienced and trained in asbestos sampling and analysis. At a minimum, documentation of prior asbestos sampling and analysis experience, plus satisfactory completion of the NIOSH 582 course or equivalent will be required. Air sample collection may be performed by an Industrial Hygienist or the Contractor's foreman at the Contractor's option. The Contractor shall perform sampling and analysis of air samples for asbestos in compliance with WAC Chapter 296-62-07735, Appendix A-WISHA reference method, or equivalent.
- B. Sample Documentation: Documentation shall be kept for each filter sample procured as to worker sampled, social security number, activity, work area location, date and time taken, volume of air drawn through filter, pump identification number and calibration. Report all data on copies of *Asbestos Air Sampling Data Form* bound in these Specifications or similar approved form within 48 hours. Fill in all information on every form. Submit chain-of-custody records along with all samples.
- C. Analysis Procedures: The samples shall be collected on 25 mm filters and analyzed within 12 hours using the membrane filter method at 400-500x magnification with phase contrast illumination--NIOSH Analytical Method No. 7400--for laboratory and field analysis. The

- analyst shall sign and submit permanent records of all samples analyzed directly to the Environmental Consultant. The Independent Testing Laboratory shall seal the unused portion of all filters in airtight containers so that individual samples can be re-analyzed at a later date if necessary. The containers shall be clearly labeled with Project Name and Sample Number and shall become property of the Owner at work completion at the Owner's request.
- D. Controls: The Contractor's testing laboratory shall submit sample analysis results, chain-of-custody and equipment calibration records to the Environmental Consultant within 24 hours of collection.
  - E. Contractor's Sampling During Abatement
    - 1. Sample Collection: Air monitoring shall be performed to determine worker exposure during the period of asbestos abatement in each work area. Begin sampling when asbestos removal commences. Samples are to be taken where Class I or II work is being conducted during each 8-hour work shift.
    - 2. Most Contaminated Worker: The Contractor shall determine which worker(s) in each work area is probably experiencing the most severe exposure. This is the "Most Contaminated Worker(s)". 8-hour TWA and 15-minute excursion samples shall be collected on this worker(s). This worker shall wear a personal sampling pump and the sample shall be drawn from the breathing zone of this worker.
    - 3. The number of air samples collected shall be in accordance with the Contractor's approved work plan, however, collect a minimum of one sample per work area daily.

#### 1.08 AIR MONITORING BY OWNER

- A. Industrial Hygienist: The Owner will retain an experienced Industrial Hygienist/ Environmental Consultant to collect and analyze asbestos air samples prior to abatement, inside the work area, outside the work area, at HEPA exhaust and after visual inspection. Documentation of sample results will be forwarded to the Contractor as appropriate.
- B. Sampling and analysis of asbestos samples shall be performed in compliance with WAC Chapter 296-62-07735, Appendix A--WISHA reference method, or equivalent.
- C. The Owner reserves the right to monitor Contractor's performance via air samples on abatement workers in addition to the Contractor's air monitoring.

#### 1.09 OWNER OCCUPANCY

- A. The area of abatement shall be occupied only by properly trained workers and authorized inspectors during abatement activities. Coordinate phasing of abatement areas to comply with occupancy requirements as defined in Section 011110, Summary of Work.

#### 1.10 WORKING HOURS

- A. Submit proposed work schedule to Owner for approval in conjunction with submittals required by this Section. The Owner reserves the right to restrict and curtail any operations

which are considered, at the Owner's sole determination, to generate such noise or activities as to interfere with facility operations. Any revisions to the approved work schedule shall be submitted in writing to the Owner a minimum of 48 hours prior to the desired schedule change.

#### 1.11 PERMITS AND NOTIFICATIONS

- A. The Contractor is responsible for obtaining all permits and notifications as required for the completion of the work by the Washington State Department of Labor and Industries, the U.S. E.P.A., the Puget Sound Clean Air Agency and any other permitting agency involved with the completion of the work included herein.

#### 1.12 Personnel Training

- A. All personnel accomplishing removal of asbestos-containing materials shall have received the minimum training as required by the Washington State Department of Labor and Industries for the work to be performed. At a minimum, the supervisor shall be the bearer of a current "Certified Asbestos Supervisor Certificate" issued by the Washington State Dept. of Labor and Industries.

#### 1.13 Liability

- A. The Contractor is an independent contractor and not an employee of the Owner, Architect or Environmental Consultant. The Owner, Architect and the Environmental Consultant shall have no liability to the Contractor or any third persons for Contractor's failure to faithfully perform and follow the provisions of these Specifications and the requirements of the governing agencies. Notwithstanding the failure of the Owner, Architect or the Environmental Consultant to discover a violation by the Contractor of any of the provisions of these Specifications, or to require the Contractor to fully perform and follow any of them, such failure shall not constitute a waiver of any of the requirements of these Specifications which shall remain fully binding upon the Contractor.

#### 1.14 Subcontractors

- A. Subcontractors employed by the Contractor shall be bound to all the work and safety standards specified. Subcontractor's personnel shall meet requirements as specified and shall be supervised by the Contractor during performance of this work.

#### 1.15 Quality Insurance

- A. On-Site Observation
  - 1. Pre-Removal: Environmental Consultant shall perform observations regarding: demarcation of regulated area, installation of critical barriers, integrity of negative pressure enclosures, waste load-out facilities, and other conditions affecting abatement work. Contractor shall request pre-removal observations a minimum of two hours prior to desired removal commencing. No abatement work shall be performed prior to pre-removal observations by the Environmental Consultant.

2. Observation: Environmental Consultant shall perform observations regarding: integrity of isolation barriers, decontamination facilities, worker protection, Contractor's air monitoring program, performance of abatement operations, and conformance to the Specification, EPA, OSHA, WISHA and PSCAA regulations.
3. Post Removal: Environmental Consultant shall perform visual inspections after the removal of asbestos-containing materials is complete. Upon completion of asbestos-related activities, all work areas shall be free of all accumulations of dust, debris or three-dimensional residue. Schedule post-removal inspections a minimum of 24 hours in advance.
4. No visual inspections will be performed on wet flooring areas. Ensure adequate drying time when scheduling inspections.
5. Stop Work: Environmental Consultant shall notify the Contractor in writing to stop work if the Environmental Consultant determines that work practices are in violation of regulations, these Specifications or work is endangering workers or occupants of the building. The Contractor shall continue work when conditions and actions are corrected and when written authorization is received from the Environmental Consultant.

#### B. Air Monitoring

1. Notification: If, at any time during the work, analysis of an air sample taken by the Contractor, Owner, or Environmental Consultant from a non-isolated regulated work area or a non-regulated area indicates a fiber concentration in excess of the applicable Control Limit, the Industrial Hygienist who analyzed the air sample shall immediately notify the Contractor's Foreman, the Environmental Consultant: PBS Environmental, the Owner and other workers, employees, occupants, etc. in affected area(s).
2. Maximum Allowable Fiber Concentrations:
  - a. Outside all Regulated Work Areas: 0.01 f/cc (fibers per cubic centimeter by PLM) or below pre-abatement;
  - b. Inside Non-Isolated Regulated Work Area: 0.05 f/cc or below pre-abatement levels;
  - c. Inside Isolated Regulated Work Area: 0.10 f/cc;
  - d. Post- Abatement: 0.01 f/cc, or 70 s/mm<sup>2</sup> by TEM, as applicable.
3. Procedures: Immediately upon being notified of fiber concentration in excess of the Control Limit, the Contractor shall perform the following steps in the order presented, at no additional cost to the Owner:
  - a. Stop abatement work and identify source of high fiber counts.
  - b. Corrective Actions: Immediately correct containment breaches, pressure differential changes and potential cause of high fiber counts. The Environmental Consultant will determine the affected are considered to be contaminated. The Environmental Consultant will determine the actions to be taken by the Contractor at no additional cost to the Owner.
  - c. Clean the affected area using wet methods and HEPA vacuuming.
  - d. Re-sample air until fiber counts are determined to be below the specified maximum levels.
  - e. Secure and repair containment barriers, repair or add equipment.
  - f. Modify work procedures and make other changes to reduce fiber counts.

4. Complete every part of the "Fiber Count Above Control Limit Data Form" bound into these Specifications. Resume work and air monitoring.
  5. Additional Costs: The Contractor shall be responsible for costs of any testing, cleanup, repair, down time loss, etc. that is a result of the Contractor's negligence, poor maintenance of isolated areas, failed post-abatement sampling and improper procedures.
- C. Performance: Work shall be performed in a skillful manner representing industry standards. Environmental Consultant shall require Contractor to remove from the work site employees and subcontractors the Environmental Consultant deems incompetent, careless or objectionable.

## PART 2 – PRODUCTS

### 2.01 PROTECTIVE CLOTHING AND EQUIPMENT

- A. Protective Clothing: Provide approved clothing per WAC 296-62 for all workers and all official representatives of the Owner, State or other governmental entity, and the Environmental Consultant who may require such clothing.
- B. Respirators: At a minimum, respiratory protection shall be approved by NIOSH/MSHA (National Institute for Occupational Safety and Health/Mine Safety and Health Administration), United States Department of Labor, and U.S. Department of Health, Education and Welfare, Centers for Disease Control, in accordance with WAC Chapter 296-62-071. Respiratory protection shall provide workers with a maximum calculated fiber level inside the mask of 0.01 f/cc.
  1. Selection: As part of the Contractor's Respiratory Protection Program, all workers shall be provided with a selection of brands and sizes of respirators to choose from. At a minimum, all workers shall be quantitatively or qualitatively fit-tested at the time of respirator selection per WAC Chapter 296-62-07715.
  2. Contractor shall supply replacement filter cartridges as required. Cartridges which have become wet or clogged shall be replaced immediately.
  3. Contractor shall provide personal protective equipment and supplies to the Environmental Consultant and authorized visitors for use on the site.

### 2.02 MATERIALS

- A. Encapsulants (Sealants): Encapsulants shall be rated as "Acceptable" using the test method described in the EPA document published as National Technical Information Service report PB 88-113 329/AS [available from NITS, 5825 Port Royal Road, Springfield, VA 22161.] (The report is summarized in EPA publication EPA/600/S-87/091 [available from Center for Environmental Research Information, EPA 26 Martin Luther King, and Cincinnati, OH 45268].)
- B. Plastic Sheeting: Plastic sheeting shall be flame-retardant polyethylene material, sized in lengths and widths to minimize the frequency of joints. Exterior applications require reinforced plastic sheeting. Plastic sheeting shall be minimum thickness of 6-mil for specific uses itemized by applicable codes and regulations. For other applications plastic sheeting shall be of adequate thickness to achieve the intended level of protection or functionality.

- C. Warning Labels: Warning labels on plastic bags and disposal containers shall include the following information:

DANGER CONTAINS  
ASBESTOS FIBERS MAY  
CAUSE CANCER  
CAUSES DAMAGE TO LUNGS  
DO NOT BREATHE DUST  
AVOID CREATING DUST

- D. Warning Signs: Warning signs shall be provided and displayed at each regulated area in accordance with WAC Chapter 296-62-07721. Warning signs shall include the following information:

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

### PART 3 – EXECUTION

#### 3.01 WORK AREA PREPARATION

##### A. Worker Decontamination Facilities

###### 1. Modified Worker Decontamination Enclosure System

- a. At entrances to non-isolated work areas the Contractor shall construct a personnel decontamination enclosure system or area consisting of plastic sheeting barriers with a HEPA vacuum and water source and satisfying the requirements of WAC 296-62-07712. The system shall include a remote or adjoining decontamination area.
- b. Contractor shall not begin asbestos abatement work unless this system is functional, in good repair, and has been found acceptable for specification compliance by the Environmental Consultant.

##### B. Access to Work Areas by Others

1. Except for emergency personnel, the Contractor shall limit access to the work area to authorized visitors.
2. The Contractor shall provide protective clothing, respirators, and equipment for all authorized visitors, as specified.
3. All authorized visitors shall be subject to the personnel protection provisions specified above and shall sign in and out on the Worksite Entry Logbook.

##### C. Personnel Protection during Work in Non-Isolated Work Areas

1. Work clothes per 2.01-A, and respiratory protection per 2.01-B.
2. Clothing: Workers shall wear two layers of coveralls after removal of street clothes. Worker decontamination will consist of personal decontamination in a regulated area over drop plastic sheeting with a HEPA vacuum and wet methods. The first layer of coveralls must be removed when exiting the work area.

3. Workers shall not eat, drink or chew gum at the worksite except in the established clean room. Smoking or using other tobacco products is prohibited.
4. Workers shall be fully protected with respirators and protective clothing immediately prior to the first disturbance of asbestos-containing or contaminated material and until final cleanup is completed.

D. Emergency Precautions

1. Emergency Exits: The Contractor shall establish emergency and fire exits from the work area. Contractor shall ensure these exits are well marked and remain unobstructed.
2. First Aid: The Contractor shall be prepared to administer first aid to injured personnel after decontamination. Seriously injured personnel shall be treated immediately or evacuated without delay for decontamination.
3. Fire Department: Contractor shall notify the local fire department of the asbestos abatement project prior to beginning work area preparation.
4. Contractor shall provide fire extinguishers at all abatement work areas.
5. Emergency Clean-up: Contractor to submit to the Environmental Consultant for approval, an emergency control and cleanup plan to be followed in the event of asbestos contamination during work in non-isolated work areas. Contractor shall ensure all workers are thoroughly familiar with approved plan.

E. Building Security and Protection

1. The Contractor shall post adequate warning signs at all potential entrances to work areas.
2. Building Protection: Contractor shall protect all existing fixed equipment, existing building finishes that are to remain, and existing systems and functions from damage during the abatement process. Extra precautions are to be taken in protecting existing electrical panels, light fixtures, etc. Any damage to existing building, services, and/or equipment shall be remedied by the Contractor at his expense.
3. Power Failure: Contractor shall notify Environmental Consultant and Owner immediately when a power failure occurs. Asbestos abatement work will stop, and the work area will be misted with water. If power failure exceeds 15 minutes, workers shall use appropriate personnel decontamination procedures and shall seal the work area.
4. Contractor shall maintain access and use of existing fire lanes and maintain security measures to prevent unauthorized access, theft or vandalism.

3.02 NON-ISOLATED WORK AREA PREPARATION

- A. Performance: Contractor shall perform the following procedures in the order in which they are presented for work in non-isolated work areas according to the approved work plan. Any alternative control measures considered for Class II asbestos abatement work involving the removal of ACM that is not TSI, surfacing or sheet flooring materials shall be approved by the Environmental Consultant and performed in accordance with 29 CFR 1926.1101.
  1. Coordinate to ensure shut down and isolation of any HVAC equipment near work areas. Coordinate with Owner regarding all electrical, safety and other service

connections, requirements and equipment. Contractor is responsible to detect operation of systems intended to be shut down during abatement.

2. Install critical barriers at any HVAC openings, adjacent doors, windows and other openings to work areas.
3. Completely pre-clean visible accumulation of any debris in work area using HEPA vacuum equipment or wet cleaning methods.
4. Set up a modified worker decontamination enclosure system as described above. Once this system is installed and abatement commences, it shall be utilized in the specified manner for decontamination of only personnel. All personnel shall sign the Worksite Entry Logbook each time they enter or exit the work area. Work performed outdoors in excavated areas shall be performed wearing two disposable suits.
5. Cover horizontal surfaces and other objects below work area with plastic sheeting.
6. Have emergency cleanup equipment and supplies, including HEPA vacuum, amended water, disposal bags, buckets, towels and sponges, on hand prior to start of abatement work.

- B. Compliance: No asbestos abatement work shall occur unless the work area has been found acceptable for Specification compliance by the Environmental Consultant. Notifications to perform asbestos abatement and the Hazardous Materials Inspection Summary shall be posted at the work site.

### 3.03 ISOLATED WORK AREA PREPARATION (NEGATIVE PRESSURE ENCLOSURE)

- A. Coordinate to ensure shut down and isolation of any HVAC equipment near work areas. Contractor shall coordinate all electrical, safety and other service connections, requirements and equipment. Contractor is responsible to detect operation of systems intended to be shut down during abatement.
- B. Remove all uncontaminated removable equipment, fixtures, and supplies from the Work Area before commencing Work. Completely pre-clean and cover all unmovable furnishings or equipment with two layers of polyethylene sheeting, securely taped in place with duct tape. Such fixtures and equipment shall be considered outside the Work Area unless plastic or seal is breached. Contractor is responsible for any damage to these items while working in these areas.
- C. Install critical barriers as follows:
1. Individually clean and seal all ventilation openings (supply and exhaust), doorways, lighting fixtures, floor drains and all other openings into the Work Area with two layers of reinforced polyethylene sheeting, taped securely in place with duct tape. Maintain seal until all Work is completed. Provide scaffolding and rigid post as necessary for proper structure integrity when negative pressure is applied.
  2. Clean and seal all lighting fixtures and HVAC diffusers with duct tape, and plastic sheeting to provide an airtight and watertight seal. Take care to avoid wrapping plastic sheeting on light fixtures, which may generate heat. Ensure that all electrical conduit connections and other electrical devices inside the Work Area that are exposed to moisture are sealed.

3. Use duct tape to seal all seams of HVAC ductwork or other system components that extend through Work Area.
  4. Completely pre-clean visible accumulation of any debris in work area using HEPA vacuum equipment or wet cleaning methods.
  5. Seal all openings through the floor at columns and piping risers with a fire-stop sealant to provide an airtight and watertight separation between the Work Area and the floor below.
  6. Seal all doorways and openings into work areas with hard rigid barriers and cover with a layer of reinforced plastic sheeting for dust controls.
- D. Construct separate Decontamination Units in compliance with EPA, OSHA, and WISHA guidelines concerning number, size and placement of airlocks, etc. Shower in worker Decontamination Unit shall open into airlock on both contaminated and uncontaminated sides. Construct Decontamination Units of appropriate materials (including black plastic sheeting). Shower in personnel Decontamination Unit shall contain both hot and cold running water. Supply sufficient shower units to comply with OSHA regulations. Post OSHA decontamination procedures in Change Room and Equipment Room for duration of Project. Water for the showers shall be plumbed from an Owner-designated source.
- E. Trap shower wastewater using filters having a maximum pore size of 5.0 microns and drain into a sanitary sewer. Replace contaminated filters when they become clogged but not less than every third day. Dispose of filters as contaminated waste.
- F. Submit the proposed route of exhaust of negative air pressure to Environmental Consultant prior to initiating its use. Place Work Area under negative air pressure utilizing negative air equipment. Allow no air movement system or air filtering equipment to discharge unfiltered air outside the Work Area. Maintain a negative pressure in the Work Area continuously (24 hours per day) from the start of removal of asbestos-containing material until the area is decontaminated and certified as such by the required air testing. Ensure that the air within the Work Area is changed at least once every 15 minutes and maintain a pressure differential of at least - 0.02 inches of water between the air within the Work Area and the air outside the Work Area. Provide manometer device with paper read-out for all full enclosure/isolation Work Areas.
- G. Notify Environmental Consultant for observation and acceptance of all critical barriers, HEPA filtration systems, and Decontamination Units before proceeding with installation of Primary Barrier.
- H. Install Primary Barrier as Follows
1. Clean all surfaces in Work Area using a HEPA filtered vacuum and by wet wiping prior to the installation of the Primary Barrier.
  2. Cover floor of Work Area with one layer of reinforced polyethylene sheeting, turned up walls at least 12 inches. Form a sharp right-angle bend at junction of floor and wall so that there is no radius that could be stepped on causing the wall attachment to be pulled loose. Use spray cement and duct tape to seal all seams in floor covering.  
supported and sealed with duct tape and spray cement. Seal all joints, including the

3. Cover all walls in Work Area with one layer of polyethylene sheeting, mechanically

supported and sealed with duct tape and spray cement. Seal all joints, including the

joining with the floor, with duct tape.

4. Notify Environmental Consultant for visual review and acceptance of Work Area preparation before proceeding with installation of Secondary Barrier.

I. Install Secondary Barrier as Follows:

1. Cover floor of Work Area with a second layer of polyethylene sheeting, turned up walls at least 12 inches. Form a sharp right-angle bend at junction of floor and wall so there is no radius of sheeting that could be stepped on causing the wall attachment to be pulled loose. Locate seams at least six feet from, or at right angles to, seams in Primary Barrier layer. Use spray cement and duct tape to seal entire length of all seams in floor covering.
2. Cover all walls in Work Area with a second layer of polyethylene sheeting. Support polyethylene sheeting on wall with duct tape; seal top of Secondary Barrier to Primary Barrier with duct tape so debris cannot get behind it.
3. Install sheeting so Secondary Barrier can be removed independently of the Primary Barrier.
4. Notify Environmental Consultant for visual review and acceptance of Secondary Barrier before proceeding with any abatement activities.

- J. Maintain emergency and fire exits from the Work Areas, or establish alternative exits satisfactory to fire officials.

- K. Ensure that all barriers remain effectively sealed and taped for the duration of abatement activities and subsequent cleaning. Repair damaged barriers and remedy defects immediately upon discovery. Visually inspect enclosure at the beginning of each Work period. Repair damaged barriers and remedy defects immediately upon discovery.

3.04 REMOVAL/IMPACT OF ASBESTOS-CONTAINING MATERIALS

- A. Contractor shall remove all asbestos-containing materials as defined in these Contract Documents as necessary to accomplish the Work in accordance with procedures outlined in the Pre-Job Submittals and in accordance with all local, state, and federal regulations.
- B. Contractor shall apply spray coat of amended water to asbestos materials to be removed. Keep material damp during entire removal process. A fine mist of water shall be continuously applied to all materials being removed using mechanical methods.
- C. Immediately place asbestos-containing materials in properly labeled asbestos waste bags following removal.
- D. Contractor shall maintain a safe and uncluttered work site including staging area, work area, worker decontamination system, and waste load-out area.
- E. Contractor shall make available at all times all regulated areas for inspection by the Environmental Consultant. At no time shall access to regulated areas be restricted to any authorized personnel.

- F. Contractor shall make penetrations of/attachments to asbestos-containing materials using proper work practices and engineering controls per applicable regulations and the pre-approved Work Plan.
- G. Measurement and payment for removal of hard-mudded pipe fitting insulation will be one linear foot (LF) per single hard-mudded fitting.

3.05 SELECTIVE DEMOLITION TO ACCESS MATERIALS TO BE ABATED

- A. Perform selective demolition as required to access asbestos materials to be removed.

3.06 DISPOSAL

- A. Regulations: The Contractor shall determine current waste handling, transportation, and disposal regulations for the work site and for each waste disposal landfill. The Contractor must comply with these regulations and U.S. Department of Transportation, PSAPCA Regulation II, Article 4 and EPA requirements. Double-bagged material in sealed containers shall be delivered to the pre-designated disposal site.
- B. Waste Load-Out: Contractor shall coordinate activities to ensure that all asbestos-containing waste is properly containerized and removed from all work areas prior to the end of each work shift. Contractor shall prevent the accumulation of waste containers within work areas and shall ensure that all waste containers are stored in lockable, properly sealed storage container(s) approved by the Owner at the end of each work shift.
  - 1. Protect stored items and finishes located in areas of waste load-out and entry/egress.
  - 2. Utilize waste load-out routes and times as defined in the pre-approved Work Plan.
- C. Transport: Contractor shall remove decontaminated containers from site within ten calendar days after collection for disposal at a waste disposal site operated in accordance with the provisions of 40 CFR 61.156. Notify disposal site in advance of delivery to ensure immediate disposal. Maintain chain-of-custody until accepted by the landfill.
- D. Submit disposal receipts (or "letter of acknowledgement") and chain-of custody for waste as specified. Contractor shall make available all disposal manifests and receipts upon request from the Environmental Consultant or Owner.

END OF SECTION

# **Hazardous Materials Survey Report**

Bainbridge Aquatic Center Renovation – Ray Williamson  
Pool Building Renovation  
8521 Madison Ave N  
Bainbridge Island, Washington

Prepared for:

Bainbridge Island Metro Park and Recreation District  
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Bainbridge Island, WA 98110

April 23, 2024

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### APPENDICES

#### APPENDIX A: PLM Bulk Sampling Information

PLM Bulk Sample Inventory

PLM Bulk Sample Laboratory Data Sheets and Chain-of-Custody Documentation

#### APPENDIX B: AA Lead Paint Chip Sampling Information

AA Lead Paint Chip Sample Inventory

AA Lead Paint Chip Laboratory Data Sheets and Chain-of-Custody Documentation

#### APPENDIX C: PCB Sampling Information

PCB Sample Inventory

PCB Laboratory Data Sheets and Chain-of-Custody Documentation

#### APPENDIX D: Metals in Masonry Components Sampling Information

RCRA 8 Sample Inventory

RCRA 8 Laboratory Data Sheets and Chain-of-Custody Documentation

#### APPENDIX E: Certification

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## 1 INTRODUCTION

### 1.1 Project Background

PBS Engineering and Environmental LLC (PBS) performed a hazardous materials survey of the Ray Williamson Pool at the Bainbridge Island Aquatic Center located in Bainbridge Island, WA in conjunction with the planned renovation of the structure. One intent of this investigation is to ensure that Bainbridge Island Metro Park and Recreation District is in compliance with applicable regulatory requirements that a "good faith inspection" for asbestos-containing materials (ACMs) be performed prior to renovation activities.

At the request of the Bainbridge Island Metro Park and Recreation District all accessible building areas associated with the project were inspected for the presence of ACMs, lead-containing paint (LCP), mercury-containing fluorescent lamps, PCB-containing materials, and metals in masonry components.

### 1.2 Building Description

The Ray Williamson pool is a single-story masonry building with a concrete foundation built originally as an outdoor pool in 1970. A roof structure was added to the pool in 1977. The interior consists of the pool and pool deck area, locker rooms, and offices. The interior generally consists of concrete masonry unit (CMU) and gypsum wallboard walls, 2'x4' lay-in ceiling tile, wood deck, and gypsum wallboard ceilings, and carpet, ceramic tile, epoxy, and concrete flooring. Interior windows and doors are metal framed. The exterior consists of brick walls with metal framed window and doors. Heating and cooling is provided by a forced air HVAC system with uninsulated duct work. The roof area over the offices and locker rooms is flat with a built-up roof system.

The pitched section of roof was not included in this investigation.

### 1.3 Survey Process

All accessible areas were inspected by AHERA Certified Building Inspector Ryan Hunter (Cert. No. IRO-24-7254B, Exp. 3/05/2025) on March 28<sup>th</sup> and April 2<sup>nd</sup>, 2024. PBS endeavored to inspect all accessible areas within our scope of work. Inaccessible areas consist of those requiring selective demolition, fall protection, or confined space entry protocols in order to gain access.

When observed, suspect asbestos materials were sampled. All samples were assigned a unique identification number and transmitted for analysis to NVL Laboratories (NVLAP #102063-0) under chain-of-custody protocols. Samples were analyzed according to EPA Method 600R-93/116 using Polarized Light Microscopy (PLM), which has a reliable limit of quantification of 1% asbestos by volume. Information regarding the type and location of sampled materials can be found on the attached PLM Sample Inventory.

Suspect ACMs may exist in inaccessible areas. PBS endeavored to determine the presence and estimate the condition of suspect materials in all inaccessible areas included in the scope of work. While PBS has endeavored to identify the ACMs that may be found in concealed locations, additional unidentified ACMs may exist which may include waterproofing membrane, internal gaskets, insulation on buried pipe mechanical systems, caulking and sealants of HVAC equipment and construction adhesives and wall mastics.

## 2 FINDINGS

### 2.1 Asbestos-Containing Materials (ACMs)

Asbestos materials are defined by 40 CFR Part 763 AHERA as containing greater than 1% asbestos content. The following materials were determined to contain greater than 1% asbestos.

- **Tank Insulation – Hot Water Tank in Basement Mechanical Room – Approx. 210 Square Feet**

- **Exposed Hard Mudded Fitting Insulation associated with non-ACM Fiberglass Straight-run Insulation – Mechanical Rooms – Approx. 45 EA**
- **Concealed Hard Mudded Fitting Insulation associated with non-ACM fiberglass Straight-run Insulation – Wall and Ceiling Cavities – Estimated 50 EA**

The following materials were sampled and found **NOT** to contain detectable concentrations of asbestos.

- Fiberglass and plaster coating in pool
- Gypsum wallboard and joint compound
- Yellow carpet mastic
- Epoxy Flooring
- White 2'x4' lay-in ceiling tiles
- White 1" ceramic tile and grout
- Orange and green ceramic tile and grout
- Grout at metal window frame and concrete flooring
- Grout at concrete wall base and concrete flooring
- Interior brick and mortar
- Exterior brick and mortar
- Mortar associated with CMU
- Caulking at wall panels in showers
- Brown interior door frame caulk
- Brown interior window frame caulk
- Black interior window putty
- Black exterior window putty
- Exterior window frame caulk at rough opening and brick
- Exterior window frame caulk at metal and wood beam
- Exterior window frame caulk at frame and metal base
- Exterior window frame caulk at frame and metal column
- Gray caulk at roof exhaust
- Black felt paper behind wood siding
- Black asphaltic material in roof drain
- Parapet roofing at flat roofs
- Roofing at lobby windows
- Built-up Roofing on flat roofs

Refer to Appendix A for a complete listing of representative bulk sampling and associated laboratory analysis.

## 2.2 Lead-Containing Components

A total of eight (8) representative paint coatings were sampled throughout the structure for lead content. The samples were assigned unique identification numbers and transmitted to NVL Laboratories (AIHA IH #101861) in Seattle, WA under chain-of-custody protocols for analysis using Flame Atomic Absorption. The following describes specific testing that was conducted.

One (1) of the eight (8) samples collected was found to contain lead above detectable limits.

- **Blue paint** – on metal door frame at filter room (0.014% lead)

Samples determined **NOT** to contain lead above detectable limits include:

- White paint – on gypsum wallboard wall in Tutor Office #6
- White paint – on CMU wall at Pool deck west wall

- Blue paint – on brick wall at Pool Deck south wall
- White paint – on brick wall in Lobby Room #9
- Blue paint – on metal door frame at Lobby Room #9
- White paint – on metal support of spring board
- Brown paint – on exterior metal roof flashing

Refer to Appendix B for a complete listing of paint chip sampling and associated laboratory analysis.

### 2.3 Mercury-Containing Components

All fluorescent light tubes are presumed to contain mercury. PBS counted the number of fluorescent tubes in the areas to be impacted for the purposes of mercury vapor recovery prior to demolition activities.

- Approximately 100 four-foot fluorescent light tubes and 50 eight-foot light tubes were identified as part of this survey.

### 2.4 PCB-Containing Components

PBS used a Phillips electronic ballast checker to inspect all fluorescent light fixture ballasts throughout the building. Magnetic ballasts are presumed to contain PCB's while electronic ballasts do not contain PCB's. Light fixture ballasts inspected were observed to be electronic and magnetic. Approximately two (2) magnetic ballasts were observed in the rooftop mechanical rooms. Magnetic ballasts should be presumed to contain PCBs and properly removed, stored, transported and disposed of in accordance with Washington Administrative Code (WAC) 173-303 Dangerous Waste Regulations and 40 CFR Part 761 Subpart D. PBS recommends all light ballasts be inspected prior to disposal.

Four (4) representative caulking/sealant samples were collected and analyzed for the presence of PCBs. The samples were assigned a unique identification number and transmitted to NVL Laboratories in Seattle, Washington under chain-of-custody protocols for analysis. The samples were analyzed by EPA Method 8082.

The following material was sampled and determined to contain PCBs less than 50 ppm:

- Exterior window frame caulk at rough opening and brick wall at Lobby Entrance – 1.6 ppm

The following materials were sampled for PCB content and found **NOT** to contain PCBs:

- Interior door frame caulk at pool deck at east entrance
- Exterior window frame caulk at metal column and metal frame at east elevation
- Exterior door frame caulk at rough opening and brick at east elevation

Refer to Appendix C for locations and laboratory results of PCB samples.

### 2.5 Metals in Masonry Components

PBS collected a representative sample of the masonry mortar and analyzed the sample for the presence of the following regulated metals: arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. One (1) suspect masonry mortar sample was collected and delivered to Fremont Analytical for analysis by EPA Method 6020/7471 for regulated metals.

The laboratory results indicated the presence of arsenic, barium, cadmium, chromium, lead, and silver. Impact to these materials requires compliance with applicable WAC regulations including but not limited to, 296-155, which includes development and implementation of a compliance plan, exposure assessments, and waste stream characterization by the contractor prior to demolition activities.

Based on concentrations of the regulated metals found, PBS does not anticipate the masonry mortar to be considered a dangerous waste for disposal purposes. However, this does not alleviate the Contractor's requirement to characterize the actual final waste streams generated during demolition activities.

See Appendix D for sample inventory, laboratory data and chain of custody information.

### **3 RECOMMENDATIONS**

#### **3.1 ACMs**

PBS recommends that all ACMs that may be impacted by the planned renovation be removed prior to construction activities, or impacted, only by a qualified Washington State licensed asbestos abatement contractor according to applicable local, state and federal regulations.

The possibility exist that suspect ACM may be present at concealed locations in wall and ceiling cavities, within HVAC equipment and potentially in other select concealed areas. These may include, but are not limited to waterproofing membrane, vapor barriers, internal gasketing, mastics, caulking, and sealants on HVAC equipment, construction adhesives, electrical insulators, below grade pipe covering and insulation.

In the event that suspect ACMs not included in this report are encountered during construction, contractors should stop work immediately and inform the Owner promptly for confirmation testing. All untested materials should be presumed asbestos-containing or tested for asbestos content prior to impact.

#### **3.2 Lead-Containing Components**

Detectible levels of lead were identified in representative painted coatings sampled as part of this investigation.

Impact of painted surfaces with detectable concentrations of lead requires construction activities to be performed according to Washington Labor and Industries regulations for Lead in Construction (WAC 296-62 and 296-155). Workers impacting LCP should be provided the proper personal protective equipment and use proper work methods to limit occupational and environmental exposure to lead until an initial exposure assessment has been conducted.

Painted coatings may exist in inaccessible areas of the work area or in secondary coatings. Any previously unidentified painted coatings should be considered lead containing until sampled and proven otherwise. All waste shall be handled in accordance with WAC 173-303.

#### **3.3 Mercury-Containing Components**

PBS recommends that all fluorescent lamps be carefully handled and recycled in accordance with applicable regulations prior to demolition. Breakage of lamps should be avoided to prevent potential exposures to mercury. Washington Department of Safety and Health requires specific training, handling, engineering controls and disposal practices when performing this work.

#### **3.4 PCB-Containing Components**

PBS recommends all light ballasts be inspected prior to disposal. Magnetic ballasts should be presumed to contain PCBs and properly removed, stored, transported and disposed of in accordance with Washington Administrative Code (WAC) 173-303 Dangerous Waste Regulations and 40 CFR Part 761 Subpart D. Electronic ballasts do not contain PCB's and can be disposed of as general debris in compliance with applicable codes and endpoint facility requirements.

Impact of materials containing less than 50 ppm PCBs requires construction activities to be performed in accordance with Washington Labor and Industries regulations (WAC 296-62, 296-155, and 296-841). Workers impacting PCBs should be provided the proper personal protective equipment and use proper work methods to limit occupational and environmental exposure to PCBs until an initial exposure assessment has been conducted.

### **3.5 Metals in Masonry Components**

Representative masonry mortar from the project site was sampled and found to contain regulated metals (i.e. arsenic, barium, cadmium, chromium, lead, and silver) by laboratory analysis.

Impact of masonry mortar with detectable concentrations of regulated metals requires construction activities to be performed according to Washington Labor and Industries regulations (WAC 296-62 and 296-155). Workers impacting regulated metals should be provided the proper personal protective equipment and use proper work methods to limit occupational and environmental exposures until an initial exposure assessment has been conducted. Additionally, this may include development and implementation of a metals-compliance plan, control of wastewater discharge/capture, and waste stream characterization.

Report prepared by:

Ryan Hunter  
Project Manager / AHERA Building Inspector  
Cert. # IRO-24-7254B, expiration 3/05/2025

## **APPENDIX A**

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### **PLM Bulk Sampling Information**

PLM Bulk Sample Inventory

PLM Bulk Sample Laboratory Data Sheets

PLM Bulk Sample Chain-of-Custody Documentation

**Bainbridge Aquatic Center Renovation - Ray Williamson Pool  
Bainbridge Island Metro Park and Recreation District**

**PLM ASBESTOS SAMPLE INVENTORY**

<u>PBS Sample</u>	<u>Material Type</u>	<u>Sample Location</u>	<u>Lab Description</u>	<u>Lab Result</u>	<u>Lab</u>
41924.000-001	Fiberglass Coating Plaster	Pool Wall Deep End East	Layer 1: White brittle fibrous material with white coating material Layer 2: White brittle tile Layer 3: Gray cementitious material	NAD NAD NAD	NVL
41924.000-002	Fiberglass Coating Plaster	Pool Wall Deep End South	Layer 1: White brittle fibrous material with white coating material Layer 2: White brittle tile Layer 3: Gray cementitious material	NAD NAD NAD	NVL
41924.000-003	Fiberglass Coating Plaster	Pool Wall Shallow End West	Layer 1: White brittle fibrous material with white coating material Layer 2: White brittle tile Layer 3: Gray cementitious material	NAD NAD NAD	NVL
41924.000-004	Fiberglass Coating Plaster	Pool Wall Shallow End North	Layer 1: White brittle fibrous material with white coating material Layer 2: White brittle tile Layer 3: Gray cementitious material	NAD NAD NAD	NVL
41924.000-005	Fiberglass Coating Plaster	Pool Cove North	Layer 1: White brittle fibrous material with white coating material Layer 2: White brittle tile Layer 3: Gray cementitious material	NAD NAD NAD	NVL
41924.000-006	Fiberglass Coating Plaster	Pool Cove South	Layer 1: White brittle fibrous material with white coating material Layer 2: White brittle tile Layer 3: Gray cementitious material	NAD NAD NAD	NVL
41924.000-007	Fiberglass Coating Plaster	Pool Deep End Floor	Layer 1: White brittle fibrous material with white coating material Layer 2: White brittle tile Layer 3: Gray cementitious material	NAD NAD NAD	NVL

**Bainbridge Aquatic Center Renovation - Ray Williamson Pool  
Bainbridge Island Metro Park and Recreation District**

**PBS Engineering + Environmental  
PBS Project #41924.000**

**PLM ASBESTOS SAMPLE INVENTORY**

<u>PBS Sample</u>	<u>Material Type</u>	<u>Sample Location</u>	<u>Lab Description</u>	<u>Lab Result</u>	<u>Lab</u>
41924.000-008	Fiberglass Coating Plaster	Pool Shallow End Floor	Layer 1: White brittle fibrous material with white coating material Layer 2: White brittle tile Layer 3: Gray cementitious material	NAD NAD NAD	NVL
41924.000-009	Joint compound Gypsum wallboard	Northeast Storage	Layer 1: Off-white compacted powdery material with paint Layer 2: Beige chalky material with paper	NAD NAD	NVL
41924.000-010	Joint compound Gypsum wallboard	Filter Room	Layer 1: White compacted powdery material with paint Layer 2: White chalky material with paper	NAD NAD	NVL
41924.000-011	Joint compound Gypsum wallboard	Boy's Locker Room Ceiling	Layer 1: White compacted powdery material with paint Layer 2: Beige chalky material with paper	NAD NAD	NVL
41924.000-012	Yellow carpet mastic	Lobby	Layer 1: Yellow brittle mastic	NAD	NVL
41924.000-013	Epoxy floor	Stairs to Boy's Locker Room	Layer 1: Brown-red thin brittle material with paint	NAD	NVL
41924.000-014	Epoxy floor	Girl's Locker Room	Layer 1: Brown-red thin brittle material with paint	NAD	NVL
41924.000-015	White 2' x 4' lay-in ceiling tile	Pool Area	Layer 1: Off-white fibrous material with white paint	NAD	NVL
41924.000-016	White 1" ceramic tile Grout	Pool Deck at Pool Edge	Layer 1: White ceramic tile Layer 2: White brittle material Layer 3: Red crumbly material	NAD NAD NAD	NVL
41924.000-017	Orange ceramic tile	Boy's Locker Room Wall	Layer 1: Orange brittle tile material	NAD	NVL
41924.000-018	Green ceramic tile Grout	Girl's Locker Room Wall	Layer 1: Green brittle tile material Layer 2: Gray cementitious material	NAD NAD	NVL
41924.000-019	Grout at window frame and concrete	Pool Deck East Interior	Layer 1: Gray cementitious material	NAD	NVL
41924.000-020	Grout at Concrete wall base and slab	Pool Deck East Interior	Layer 1: Gray cementitious material with debris	NAD	NVL
41924.000-021	Red brick Mortar	Boy's Locker Room Wall	Layer 1: Brown-red brittle tile Layer 2: Gray cementitious material	NAD NAD	NVL

**Bainbridge Aquatic Center Renovation - Ray Williamson Pool**  
**Bainbridge Island Metro Park and Recreation District**

**PBS Engineering + Environmental**  
**PBS Project #41924.000**

**PLM ASBESTOS SAMPLE INVENTORY**

<u>PBS Sample</u>	<u>Material Type</u>	<u>Sample Location</u>	<u>Lab Description</u>	<u>Lab Result</u>	<u>Lab</u>
41924.000-022	Mortar associated with CMU	Boy's Locker Room Wall	Layer 1: White brittle material with paint	NAD	NVL
41924.000-023	Wall panel caulking	Boy's Locker Room Shower Wall	Layer 1: White hard rubbery material	NAD	NVL
41924.000-024	Hard mudded pipe fitting	Mechanical Basement	Layer 1: White flaky fibrous material with white interwoven fibrous material and paint	<b>3% Amosite</b>	NVL
41924.000-025	Hard mudded pipe fitting	Mechanical Basement	Layer 1: White flaky fibrous material	<b>2% Amosite</b>	NVL
41924.000-026	Hard mudded pipe fitting	Filter Room	Layer 1: White flaky fibrous material	<b>2% Amosite</b>	NVL
41924.000-027	Tank insulation	Mechanical Basement	Layer 1: White flaky fibrous material with white fibrous mesh and paint	<b>2% Amosite</b>	NVL
41924.000-028	Tank insulation	Mechanical Basement	Layer 1: White flaky fibrous material with white fibrous mesh and paint	<b>3% Amosite</b>	NVL
41924.000-029	Tank insulation	Mechanical Basement	Layer 1: White flaky fibrous material with white fibrous mesh and paint	<b>2% Amosite</b>	NVL
41924.000-030	Brown interior door frame caulk	Lobby	Layer 1: Black soft sticky material with paint	NAD	NVL
41924.000-031	Brown interior door frame caulk	Pool Deck East Interior	Layer 1: Black soft sticky material with paint	NAD	NVL
41924.000-032	Brown interior door frame caulk	Pool Deck West Interior	Layer 1: Black soft elastic material	NAD	NVL
41924.000-033	Brown interior door frame caulk	Filter Room to Pool	Layer 1: Black soft elastic material	NAD	NVL
41924.000-034	Brown interior window frame caulk	Lobby	Layer 1: Black soft crumbly material	NAD	NVL
41924.000-035	Brown interior window frame caulk	Pool Deck West Interior	Layer 1: Black soft rubbery material	NAD	NVL
41924.000-036	Black interior window putty	Lobby Clerestory Windows	Layer 1: Black sticky material	NAD	NVL
41924.000-037	Exterior brick Mortar	East Elevation	Layer 1: Brown hard brittle material Layer 2: Gray sandy material with debris	NAD NAD	NVL

**Bainbridge Aquatic Center Renovation - Ray Williamson Pool  
Bainbridge Island Metro Park and Recreation District**

**PLM ASBESTOS SAMPLE INVENTORY**

<u>PBS Sample</u>	<u>Material Type</u>	<u>Sample Location</u>	<u>Lab Description</u>	<u>Lab Result</u>	<u>Lab</u>
41924.000-038	Black exterior window putty patch	Roof Pool Windows	Layer 1: Black soft material with debris	NAD	NVL
41924.000-039	Black exterior window putty	Roof Pool Windows	Layer 1: Black soft/elastic material with debris	NAD	NVL
41924.000-040	Exterior window frame caulk at rough opening and brick	East Elevation North	Layer 1: Dark gray brittle material with debris	NAD	NVL
41924.000-041	Exterior window frame caulk at metal and wood beam	East Elevation Central	Layer 1: Gray soft material with debris	NAD	NVL
41924.000-042	Exterior window frame caulk at frame and metal base	East Elevation	Layer 1: Black soft/elastic material with debris	NAD	NVL
41924.000-043	Exterior window frame caulk at rough opening and brick	East Elevation South Side	Layer 1: Gray brittle material with debris	NAD	NVL
41924.000-044	Exterior window frame caulk at metal column and frame	South Elevation	Layer 1: Dark gray soft material with debris Layer 2: Clear soft/elastic material with debris	NAD NAD	NVL
41924.000-045	Exterior window frame caulk at metal and brick	South Elevation	Layer 1: Dark gray soft material with debris	NAD	NVL
41924.000-046	Exterior window frame caulk at frame and wood siding	Pool Roof Windows	Layer 1: Brown soft/elastic material with paint & debris Layer 2: Black thin brittle material with debris	NAD NAD	NVL
41924.000-047	Exterior window frame caulk at wood frame and metal	Roof Lobby Windows	Layer 1: Brown soft material with debris	NAD	NVL
41924.000-048	Gray caulk at roof exhaust	Roof East Side	Layer 1: Gray soft material with paint & debris	NAD	NVL
41924.000-049	Exterior window frame caulk at rough opening and brick	East Elevation	Layer 1: Black brittle material with debris	NAD	NVL
41924.000-050	Exterior window frame caulk at rough opening and brick	South Elevation	Layer 1: Black brittle material with debris	NAD	NVL
41924.000-051	Black felt paper behind wood siding	Roof Mech Room East	Layer 1: Brown asphaltic fibrous material	NAD	NVL

**Bainbridge Aquatic Center Renovation - Ray Williamson Pool  
Bainbridge Island Metro Park and Recreation District**

**PBS Engineering + Environmental  
PBS Project #41924.000**

**PLM ASBESTOS SAMPLE INVENTORY**

<u>PBS Sample</u>	<u>Material Type</u>	<u>Sample Location</u>	<u>Lab Description</u>	<u>Lab Result</u>	<u>Lab</u>
41924.000-052	Black felt paper behind wood siding	Roof Mech Room West	Layer 1: Brown asphaltic fibrous material	NAD	NVL
41924.000-053	Black asphaltic material in roof drain	Roof Center Drain	Layer 1: Black asphaltic material with debris Layer 2: Black asphaltic fibrous built-up material with debris	NAD NAD	NVL
41924.000-054	Parapet roofing	West Side	Layer 1: Silver paint with debris Layer 2: Multi-layered black asphaltic material with debris	NAD NAD	NVL
41924.000-055	Roofing at lobby windows	Roof South Windows	Layer 1: Silver paint with debris Layer 2: Black asphaltic fibrous built-up material with debris Layer 3: Black thin crumbly material (on wood) with debris Layer 4: Tan compressed fibrous material	NAD NAD NAD NAD	NVL
41924.000-056	Built-up roofing	Office Roof West Side	Layer 1: Silver paint Layer 2: Black asphaltic fibrous built-up material Layer 3: Multi-layered black asphaltic material Layer 4: Tan foamy material Layer 5: Multi-layered black asphaltic material	NAD NAD NAD NAD NAD	NVL
41924.000-057	Built-up roofing	Office Roof East Side	Layer 1: Silver paint Layer 3: Tan foamy material Layer 4: Multi-layered black asphaltic material	NAD NAD NAD	NVL

April 2, 2024



Ryan Hunter  
PBS Environmental - Seattle  
214 E Galer St. Suite. 300  
Seattle, WA 98102

**RE: Bulk Asbestos Fiber Analysis; NVL Batch # 2405662.00**

Client Project: 41924.000  
Location: Bainbridge Aquatic Center Renovation - Ray Williamson

Dear Mr. Hunter,

Enclosed please find test results for the 36 sample(s) submitted to our laboratory for analysis on 4/1/2024.

Examination of these samples was conducted for the presence of identifiable asbestos fibers using polarized light microscopy (PLM) with dispersion staining in accordance with **U. S. EPA 40 CFR Appendix E to Subpart E of Part 763**, Interim Method for the Determination of Asbestos in Bulk Insulation Samples and **EPA 600/R-93/116**, Method for the Determination of Asbestos in Bulk Building Materials.

For samples containing more than one separable layer of materials, the report will include findings for each layer (labeled Layer 1 and Layer 2, etc. for each individual layer). The asbestos concentration in the sample is determined by calibrated visual estimation.

For those samples with asbestos concentrations between 1 and 10 percent based on visual estimation, the EPA recommends a procedure known as point counting (NESHAPS, 40 CFR Part 61). Point counting is a statistically more accurate means of quantification for samples with low concentrations of asbestos.

The detection limit for the calibrated visual estimation is <1%, 400 point counts is 0.25% and 1000 point counts is 0.1%

Samples are archived for two weeks following analysis. Samples that are not retrieved by the client are discarded after two weeks.

Thank you for using our laboratory services. Please do not hesitate to call if there is anything further we can assist you with.

Sincerely,

A handwritten signature in black ink that reads "Kunga Woser".

Kunga Woser, Supervisor Asbestos Laboratory

The logo for NVL LABS, featuring the letters "NVL" in a large, outlined, sans-serif font, followed by "LABS" in a smaller, outlined, sans-serif font.

Testing

Lab Code: 102063-0

Enc.: Sample Results

**Phone: 206 547.0100 | Fax: 206 634.1936 | Toll Free: 1.888.NVL.LABS (685.5227)**  
**4708 Aurora Avenue North | Seattle, WA 98103-6516**



# Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: PBS Environmental - Seattle  
Address: 214 E Galer St. Suite. 300  
Seattle, WA 98102

**Batch #: 2405662.00**  
Client Project #: 41924.000  
Date Received: 4/1/2024  
Samples Received: 36  
Samples Analyzed: 36  
Method: EPA/600/R-93/116

**Attention: Mr. Ryan Hunter**  
Project Location: Bainbridge Aquatic Center Renovation - Ray Williamson

**Lab ID: 24034909      Client Sample #: 41924.000-001**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 3</b>	<b>Description:</b> White brittle fibrous material with white coating material			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Fine particles, Paint	Glass fibers 32%		<b>None Detected ND</b>
<b>Layer 2 of 3</b>	<b>Description:</b> White brittle tile			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Mineral grains, Fine particles	None Detected ND		<b>None Detected ND</b>
<b>Layer 3 of 3</b>	<b>Description:</b> Gray cementitious material			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Cement/Binder, Fine grains, Cementitious particles	None Detected ND		<b>None Detected ND</b>

**Lab ID: 24034910      Client Sample #: 41924.000-002**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 3</b>	<b>Description:</b> White brittle fibrous material with white coating material			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Fine particles, Paint	Glass fibers 36%		<b>None Detected ND</b>
<b>Layer 2 of 3</b>	<b>Description:</b> White brittle tile			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Mineral grains, Fine particles	None Detected ND		<b>None Detected ND</b>
<b>Layer 3 of 3</b>	<b>Description:</b> Gray cementitious material			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Cement/Binder, Fine grains, Cementitious particles	None Detected ND		<b>None Detected ND</b>

**Lab ID: 24034911      Client Sample #: 41924.000-003**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Sampled by:</b> Client		
<b>Analyzed by:</b> Akane Yoshikawa	<b>Date:</b> 04/02/2024	<i>Kunga Woser</i>
<b>Reviewed by:</b> Kunga Woser	<b>Date:</b> 04/02/2024	Kunga Woser, Supervisor Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government



# Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: PBS Environmental - Seattle  
Address: 214 E Galer St. Suite. 300  
Seattle, WA 98102

**Batch #: 2405662.00**  
Client Project #: 41924.000  
Date Received: 4/1/2024  
Samples Received: 36  
Samples Analyzed: 36  
Method: EPA/600/R-93/116

**Attention: Mr. Ryan Hunter**

Project Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 3</b>	<b>Description:</b> White brittle fibrous material with white coating material	Non-Fibrous Materials: Binder/Filler, Fine particles, Paint	Other Fibrous Materials:% Glass fibers 42%	<b>Asbestos Type: %</b> <b>None Detected ND</b>
<b>Layer 2 of 3</b>	<b>Description:</b> White brittle tile	Non-Fibrous Materials: Binder/Filler, Mineral grains, Fine particles	Other Fibrous Materials:% None Detected ND	<b>Asbestos Type: %</b> <b>None Detected ND</b>
<b>Layer 3 of 3</b>	<b>Description:</b> Gray cementitious material	Non-Fibrous Materials: Cement/Binder, Fine grains, Cementitious particles	Other Fibrous Materials:% None Detected ND	<b>Asbestos Type: %</b> <b>None Detected ND</b>

**Lab ID: 24034912 Client Sample #: 41924.000-004**

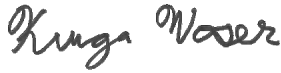
Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 3</b>	<b>Description:</b> White brittle fibrous material with white coating material	Non-Fibrous Materials: Binder/Filler, Fine particles, Paint	Other Fibrous Materials:% Glass fibers 37%	<b>Asbestos Type: %</b> <b>None Detected ND</b>
<b>Layer 2 of 3</b>	<b>Description:</b> White brittle tile	Non-Fibrous Materials: Binder/Filler, Mineral grains, Fine particles	Other Fibrous Materials:% None Detected ND	<b>Asbestos Type: %</b> <b>None Detected ND</b>
<b>Layer 3 of 3</b>	<b>Description:</b> Gray cementitious material	Non-Fibrous Materials: Cement/Binder, Fine grains, Cementitious particles	Other Fibrous Materials:% None Detected ND	<b>Asbestos Type: %</b> <b>None Detected ND</b>

**Lab ID: 24034913 Client Sample #: 41924.000-005**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 3</b>	<b>Description:</b> White brittle fibrous material with white coating material	Non-Fibrous Materials: Binder/Filler, Fine particles, Paint	Other Fibrous Materials:% Glass fibers 44%	<b>Asbestos Type: %</b> <b>None Detected ND</b>
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<b>Sampled by:</b> Client	 Kunga Woser, Supervisor Asbestos Laboratory
<b>Analyzed by:</b> Akane Yoshikawa	
<b>Reviewed by:</b> Kunga Woser	
<b>Date:</b> 04/02/2024	
<b>Date:</b> 04/02/2024	

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government



# Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: PBS Environmental - Seattle  
Address: 214 E Galer St. Suite. 300  
Seattle, WA 98102

**Batch #: 2405662.00**  
Client Project #: 41924.000  
Date Received: 4/1/2024  
Samples Received: 36  
Samples Analyzed: 36  
Method: EPA/600/R-93/116

**Attention: Mr. Ryan Hunter**

Project Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 2 of 3</b>	<b>Description:</b> White brittle tile	Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b>
		Binder/Filler, Mineral grains, Fine particles	None Detected ND	<b>None Detected ND</b>
<b>Layer 3 of 3</b>	<b>Description:</b> Gray cementitious material	Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b>
		Cement/Binder, Fine grains, Cementitious particles	None Detected ND	<b>None Detected ND</b>

**Lab ID: 24034914 Client Sample #: 41924.000-006**

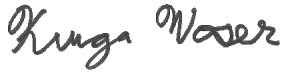
Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 3</b>	<b>Description:</b> White brittle fibrous material with white coating material	Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b>
		Binder/Filler, Fine particles, Paint	Glass fibers 46%	<b>None Detected ND</b>
<b>Layer 2 of 3</b>	<b>Description:</b> White brittle tile	Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b>
		Binder/Filler, Mineral grains, Fine particles	None Detected ND	<b>None Detected ND</b>
<b>Layer 3 of 3</b>	<b>Description:</b> Gray cementitious material	Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b>
		Cement/Binder, Fine grains, Cementitious particles	None Detected ND	<b>None Detected ND</b>

**Lab ID: 24034915 Client Sample #: 41924.000-007**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 3</b>	<b>Description:</b> White brittle fibrous material with white coating material	Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b>
		Binder/Filler, Fine particles, Paint	Glass fibers 41%	<b>None Detected ND</b>
<b>Layer 2 of 3</b>	<b>Description:</b> White brittle tile	Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b>
		Binder/Filler, Mineral grains, Fine particles	None Detected ND	<b>None Detected ND</b>

<b>Sampled by:</b> Client	
<b>Analyzed by:</b> Akane Yoshikawa	
<b>Reviewed by:</b> Kunga Woser	
<b>Date:</b> 04/02/2024	<b>Date:</b> 04/02/2024
Kunga Woser, Supervisor Asbestos Laboratory	

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government



# Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: PBS Environmental - Seattle  
Address: 214 E Galer St. Suite. 300  
Seattle, WA 98102

**Batch #: 2405662.00**  
Client Project #: 41924.000  
Date Received: 4/1/2024  
Samples Received: 36  
Samples Analyzed: 36  
Method: EPA/600/R-93/116

**Attention: Mr. Ryan Hunter**

Project Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 3 of 3</b>	<b>Description:</b> Gray cementitious material			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Cement/Binder, Fine grains, Cementitious particles	None Detected ND		<b>None Detected ND</b>

**Lab ID: 24034916**      **Client Sample #: 41924.000-008**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 3</b>	<b>Description:</b> White brittle fibrous material with white coating material			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Fine particles, Paint	Glass fibers 41%		<b>None Detected ND</b>

<b>Layer 2 of 3</b>	<b>Description:</b> White brittle tile			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Mineral grains, Fine particles	None Detected ND		<b>None Detected ND</b>

<b>Layer 3 of 3</b>	<b>Description:</b> Gray cementitious material			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Cement/Binder, Fine grains, Cementitious particles	None Detected ND		<b>None Detected ND</b>

**Lab ID: 24034917**      **Client Sample #: 41924.000-009**

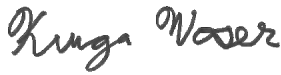
Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 2</b>	<b>Description:</b> Off-white compacted powdery material with paint			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Fine grains, Fine particles	Cellulose 3%		<b>None Detected ND</b>
	Paint			

<b>Layer 2 of 2</b>	<b>Description:</b> Beige chalky material with paper			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Gypsum/Binder, Fine grains, Calcareous particles	Cellulose 18%		<b>None Detected ND</b>

**Lab ID: 24034918**      **Client Sample #: 41924.000-010**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Sampled by:</b> Client			
<b>Analyzed by:</b> Akane Yoshikawa	<b>Date:</b> 04/02/2024		
<b>Reviewed by:</b> Kunga Woser	<b>Date:</b> 04/02/2024	Kunga Woser, Supervisor Asbestos Laboratory	

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government



# Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: PBS Environmental - Seattle  
 Address: 214 E Galer St. Suite. 300  
 Seattle, WA 98102

**Batch #: 2405662.00**  
 Client Project #: 41924.000  
 Date Received: 4/1/2024  
 Samples Received: 36  
 Samples Analyzed: 36  
 Method: EPA/600/R-93/116

**Attention: Mr. Ryan Hunter**  
 Project Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 2</b>	<b>Description:</b> White compacted powdery material with paint	Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b>
		Binder/Filler, Fine grains, Fine particles	None Detected ND	<b>None Detected ND</b>
		Paint		
<b>Layer 2 of 2</b>	<b>Description:</b> White chalky material with paper	Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b>
		Gypsum/Binder, Fine grains, Calcareous particles	Cellulose 16%	<b>None Detected ND</b>
			Glass fibers 4%	

**Lab ID: 24034919**      **Client Sample #: 41924.000-011**  
 Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 2</b>	<b>Description:</b> White compacted powdery material with paint	Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b>
		Binder/Filler, Fine grains, Fine particles	Cellulose 2%	<b>None Detected ND</b>
		Paint		
<b>Layer 2 of 2</b>	<b>Description:</b> Beige chalky material with paper	Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b>
		Gypsum/Binder, Fine grains, Calcareous particles	Cellulose 15%	<b>None Detected ND</b>
			Glass fibers 3%	

**Lab ID: 24034920**      **Client Sample #: 41924.000-012**  
 Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 1</b>	<b>Description:</b> Yellow brittle mastic	Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b>
		Mastic, Fine particles	None Detected ND	<b>None Detected ND</b>

<b>Sampled by:</b> Client		
<b>Analyzed by:</b> Akane Yoshikawa	<b>Date:</b> 04/02/2024	<i>Kunga Woser</i>
<b>Reviewed by:</b> Kunga Woser	<b>Date:</b> 04/02/2024	Kunga Woser, Supervisor Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government



# Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: PBS Environmental - Seattle  
Address: 214 E Galer St. Suite. 300  
Seattle, WA 98102

**Batch #: 2405662.00**  
Client Project #: 41924.000  
Date Received: 4/1/2024  
Samples Received: 36  
Samples Analyzed: 36  
Method: EPA/600/R-93/116

**Attention: Mr. Ryan Hunter**  
Project Location: Bainbridge Aquatic Center Renovation - Ray Williamson

**Lab ID: 24034921      Client Sample #: 41924.000-013**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

**Layer 1 of 1      Description:** Brown-red thin brittle material with paint

Non-Fibrous Materials:	Other Fibrous Materials: %	<b>Asbestos Type: %</b>
Binder/Filler, Fine particles, Paint	None Detected    ND	<b>None Detected ND</b>

**Lab ID: 24034922      Client Sample #: 41924.000-014**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

**Layer 1 of 1      Description:** Brown-red thin brittle material with paint

Non-Fibrous Materials:	Other Fibrous Materials: %	<b>Asbestos Type: %</b>
Binder/Filler, Fine particles, Paint	None Detected    ND	<b>None Detected ND</b>

**Lab ID: 24034923      Client Sample #: 41924.000-015**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

**Layer 1 of 1      Description:** Off-white fibrous material with white paint

Non-Fibrous Materials:	Other Fibrous Materials: %	<b>Asbestos Type: %</b>
Binder/Filler, Perlite, Fine particles	Cellulose    38%	<b>None Detected ND</b>
Paint		

**Lab ID: 24034924      Client Sample #: 41924.000-016**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

**Layer 1 of 3      Description:** White ceramic tile

Non-Fibrous Materials:	Other Fibrous Materials: %	<b>Asbestos Type: %</b>
Ceramic/Binder, Fine particles	None Detected    ND	<b>None Detected ND</b>

**Layer 2 of 3      Description:** White brittle material

Non-Fibrous Materials:	Other Fibrous Materials: %	<b>Asbestos Type: %</b>
Binder/Filler, Fine grains, Fine particles	None Detected    ND	<b>None Detected ND</b>

**Sampled by:** Client

**Analyzed by:** Akane Yoshikawa

**Reviewed by:** Kunga Woser

**Date:** 04/02/2024

**Date:** 04/02/2024

Kunga Woser, Supervisor Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government





# Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: PBS Environmental - Seattle  
Address: 214 E Galer St. Suite. 300  
Seattle, WA 98102

**Batch #: 2405662.00**  
Client Project #: 41924.000  
Date Received: 4/1/2024  
Samples Received: 36  
Samples Analyzed: 36  
Method: EPA/600/R-93/116

**Attention: Mr. Ryan Hunter**

Project Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 1</b>	<b>Description:</b> Gray cementitious material with debris			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Cement/Binder, Fine grains, Cementitious particles	None Detected	ND	<b>None Detected ND</b>
	Debris			

**Lab ID: 24034929**      **Client Sample #: 41924.000-021**  
Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 2</b>	<b>Description:</b> Brown-red brittle tile			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Mineral grains, Fine grains	None Detected	ND	<b>None Detected ND</b>


<b>Layer 2 of 2</b>	<b>Description:</b> Gray cementitious material			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Cement/Binder, Fine grains, Cementitious particles	None Detected	ND	<b>None Detected ND</b>

**Lab ID: 24034930**      **Client Sample #: 41924.000-022**  
Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 1</b>	<b>Description:</b> White brittle material with paint			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Mineral grains, Fine particles	None Detected	ND	<b>None Detected ND</b>
	Paint			

**Lab ID: 24034931**      **Client Sample #: 41924.000-023**  
Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 1</b>	<b>Description:</b> White hard rubbery material			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Fine particles	None Detected	ND	<b>None Detected ND</b>

<b>Sampled by:</b> Client			
<b>Analyzed by:</b> Akane Yoshikawa	<b>Date:</b> 04/02/2024		
<b>Reviewed by:</b> Kunga Woser	<b>Date:</b> 04/02/2024	Kunga Woser, Supervisor Asbestos Laboratory	

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government



# Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: PBS Environmental - Seattle  
Address: 214 E Galer St. Suite. 300  
Seattle, WA 98102

**Batch #: 2405662.00**  
Client Project #: 41924.000  
Date Received: 4/1/2024  
Samples Received: 36  
Samples Analyzed: 36  
Method: EPA/600/R-93/116

**Attention: Mr. Ryan Hunter**  
Project Location: Bainbridge Aquatic Center Renovation - Ray Williamson

**Lab ID: 24034932      Client Sample #: 41924.000-024**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

**Layer 1 of 1      Description:** White flaky fibrous material with white interwoven fibrous material and paint

Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b>
Binder/Filler, Fine particles, Paint	Glass fibers 34%	<b>Amosite 3%</b>
	Cellulose 16%	

**Lab ID: 24034933      Client Sample #: 41924.000-025**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

**Layer 1 of 1      Description:** White flaky fibrous material

Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b>
Binder/Filler, Fine particles	Glass fibers 44%	<b>Amosite 2%</b>
	Cellulose 2%	

**Lab ID: 24034934      Client Sample #: 41924.000-026**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

**Layer 1 of 1      Description:** White flaky fibrous material

Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b>
Binder/Filler, Fine particles	Glass fibers 39%	<b>Amosite 2%</b>

**Lab ID: 24034935      Client Sample #: 41924.000-027**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

**Layer 1 of 1      Description:** White flaky fibrous material with white fibrous mesh and paint

Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b>
Binder/Filler, Fine particles, Paint	Glass fibers 37%	<b>Amosite 2%</b>
	Cellulose 19%	

**Sampled by:** Client  
**Analyzed by:** Akane Yoshikawa      **Date:** 04/02/2024  
**Reviewed by:** Kunga Woser      **Date:** 04/02/2024      *Kunga Woser*  
Kunga Woser, Supervisor Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government



# Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: PBS Environmental - Seattle  
Address: 214 E Galer St. Suite. 300  
Seattle, WA 98102

**Batch #: 2405662.00**  
Client Project #: 41924.000  
Date Received: 4/1/2024  
Samples Received: 36  
Samples Analyzed: 36  
Method: EPA/600/R-93/116

**Attention: Mr. Ryan Hunter**

Project Location: Bainbridge Aquatic Center Renovation - Ray Williamson

**Lab ID: 24034936      Client Sample #: 41924.000-028**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

**Layer 1 of 1      Description:** White flaky fibrous material with white fibrous mesh and paint

Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b> <b>Amosite 3%</b>
Binder/Filler, Fine particles, Paint	Glass fibers 34%	
	Cellulose 17%	

**Lab ID: 24034937      Client Sample #: 41924.000-029**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

**Layer 1 of 1      Description:** White flaky fibrous material with white fibrous mesh and paint

Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b> <b>Amosite 2%</b>
Binder/Filler, Fine particles, Paint	Glass fibers 29%	
	Cellulose 16%	

**Lab ID: 24034938      Client Sample #: 41924.000-030**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

**Layer 1 of 1      Description:** Black soft sticky material with paint

Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b> <b>None Detected ND</b>
Binder/Filler, Fine particles, Paint	None Detected ND	

**Lab ID: 24034939      Client Sample #: 41924.000-031**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

**Layer 1 of 1      Description:** Black soft sticky material with paint

Non-Fibrous Materials:	Other Fibrous Materials:%	<b>Asbestos Type: %</b> <b>None Detected ND</b>
Binder/Filler, Fine particles, Paint	None Detected ND	

**Lab ID: 24034940      Client Sample #: 41924.000-032**

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

**Sampled by:** Client

**Analyzed by:** Akane Yoshikawa

**Reviewed by:** Kunga Woser

**Date:** 04/02/2024

**Date:** 04/02/2024

Kunga Woser, Supervisor Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government



# Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: PBS Environmental - Seattle  
 Address: 214 E Galer St. Suite. 300  
 Seattle, WA 98102

**Batch #: 2405662.00**  
 Client Project #: 41924.000  
 Date Received: 4/1/2024  
 Samples Received: 36  
 Samples Analyzed: 36  
 Method: EPA/600/R-93/116

**Attention: Mr. Ryan Hunter**  
 Project Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 1</b>	<b>Description:</b> Black soft elastic material			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Fine particles	None Detected ND		<b>None Detected ND</b>

**Lab ID: 24034941**      **Client Sample #: 41924.000-033**  
 Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 1</b>	<b>Description:</b> Black soft elastic material			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Fine particles	Cellulose <1%		<b>None Detected ND</b>

**Lab ID: 24034942**      **Client Sample #: 41924.000-034**  
 Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 1</b>	<b>Description:</b> Black soft crumbly material			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Fine particles	None Detected ND		<b>None Detected ND</b>

**Lab ID: 24034943**      **Client Sample #: 41924.000-035**  
 Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 1</b>	<b>Description:</b> Black soft rubbery material			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Fine particles	None Detected ND		<b>None Detected ND</b>

**Lab ID: 24034944**      **Client Sample #: 41924.000-036**  
 Location: Bainbridge Aquatic Center Renovation - Ray Williamson

<b>Layer 1 of 1</b>	<b>Description:</b> Black sticky material			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Fine particles	Cellulose 6%		<b>None Detected ND</b>

<b>Sampled by:</b> Client		
<b>Analyzed by:</b> Akane Yoshikawa	<b>Date:</b> 04/02/2024	<i>Kunga Woser</i>
<b>Reviewed by:</b> Kunga Woser	<b>Date:</b> 04/02/2024	Kunga Woser, Supervisor Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government

# ASBESTOS LABORATORY SERVICES



<b>Company</b> PBS Environmental - Seattle	<b>NVL Batch Number</b> <b>2405662.00</b>
<b>Address</b> 214 E Galer St. Suite. 300 Seattle, WA 98102	<b>TAT</b> 2 Days <b>AH</b> No
<b>Project Manager</b> Mr. Ryan Hunter	<b>Rush TAT</b>
<b>Phone</b> (206) 233-9639	<b>Due Date</b> 4/3/2024 <b>Time</b> 8:20 AM
<b>Cell</b> (484) 269-2138	<b>Email</b> ryan.hunter@pbsusa.com
	<b>Fax</b> (866) 727-0140

**Project Name/Number:** 41924.000      **Project Location:** Bainbridge Aquatic Center Renovation - Ray Williamson

**Subcategory** PLM Bulk

**Item Code** ASB-02      EPA 600/R-93-116 Asbestos by PLM <bulk>

**Total Number of Samples** 36      **Rush Samples** \_\_\_\_\_

Lab ID	Sample ID	Description	A/R
1	24034909	41924.000-001	A
2	24034910	41924.000-002	A
3	24034911	41924.000-003	A
4	24034912	41924.000-004	A
5	24034913	41924.000-005	A
6	24034914	41924.000-006	A
7	24034915	41924.000-007	A
8	24034916	41924.000-008	A
9	24034917	41924.000-009 Composite	A
10	24034918	41924.000-010 Composite	A
11	24034919	41924.000-011 Composite	A
12	24034920	41924.000-012	A
13	24034921	41924.000-013	A
14	24034922	41924.000-014	A
15	24034923	41924.000-015	A
16	24034924	41924.000-016	A
17	24034925	41924.000-017	A
18	24034926	41924.000-018	A

	Print Name	Signature	Company	Date	Time
<b>Sampled by</b>	Client				
<b>Relinquished by</b>	Client				

	Print Name	Signature	Company	Date	Time
<b>Received by</b>	Kelly AuVu		NVL	4/1/24	820
<b>Analyzed by</b>	Akane Yoshikawa		NVL	4/2/24	
<b>Results Called by</b>					
<input type="checkbox"/> <b>Faxed</b> <input type="checkbox"/> <b>Emailed</b>					

**Special Instructions:** \_\_\_\_\_

Date: 4/1/2024  
 Time: 9:41 AM  
 Entered By: Kelly AuVu

# ASBESTOS LABORATORY SERVICES



<b>Company</b> PBS Environmental - Seattle	<b>NVL Batch Number</b> <b>2405662.00</b>
<b>Address</b> 214 E Galer St. Suite. 300 Seattle, WA 98102	<b>TAT</b> 2 Days <b>AH</b> No
<b>Project Manager</b> Mr. Ryan Hunter	<b>Rush TAT</b>
<b>Phone</b> (206) 233-9639	<b>Due Date</b> 4/3/2024 <b>Time</b> 8:20 AM
<b>Cell</b> (484) 269-2138	<b>Email</b> ryan.hunter@pbsusa.com
	<b>Fax</b> (866) 727-0140

**Project Name/Number:** 41924.000      **Project Location:** Bainbridge Aquatic Center Renovation - Ray Williamson

**Subcategory** PLM Bulk  
**Item Code** ASB-02      EPA 600/R-93-116 Asbestos by PLM <bulk>

**Total Number of Samples** 36      **Rush Samples** \_\_\_\_\_

Lab ID	Sample ID	Description	A/R
19	24034927	41924.000-019	A
20	24034928	41924.000-020	A
21	24034929	41924.000-021	A
22	24034930	41924.000-022	A
23	24034931	41924.000-023	A
24	24034932	41924.000-024	A
25	24034933	41924.000-025	A
26	24034934	41924.000-026	A
27	24034935	41924.000-027	A
28	24034936	41924.000-028	A
29	24034937	41924.000-029	A
30	24034938	41924.000-030	A
31	24034939	41924.000-031	A
32	24034940	41924.000-032	A
33	24034941	41924.000-033	A
34	24034942	41924.000-034	A
35	24034943	41924.000-035	A
36	24034944	41924.000-036	A

	Print Name	Signature	Company	Date	Time
<b>Sampled by</b>	Client				
<b>Relinquished by</b>	Client				

Office Use Only	Print Name	Signature	Company	Date	Time
<b>Received by</b>	Kelly AuVu		NVL	4/1/24	820
<b>Analyzed by</b>	Akane Yoshikawa		NVL	4/2/24	
<b>Results Called by</b>					
<input type="checkbox"/> <b>Faxed</b> <input type="checkbox"/> <b>Emailed</b>					

**Special Instructions:** \_\_\_\_\_

Date: 4/1/2024  
 Time: 9:41 AM  
 Entered By: Kelly AuVu

Project: Bainbrige Aquatic Center Renovation – Ray Williamson

Project #: 41924.000 Page 1 of 2

Analysis requested: PLM

Date: 03/29/2024

Relinq'd by/Signature: Ryan Hunter / Ryan HB

Date/Time: 08/29/2024

Received by/Signature: Kenneth J. ...

Date/Time: 9/1/24 820

Email ALL INVOICES to: [seattleap@pbsusa.com](mailto:seattleap@pbsusa.com)

**E-mail results to:**

- |   |  |   |
|---|--|---|
| <input type="checkbox"/> Willem Mager   | <input type="checkbox"/> Ferman Fletcher | <input type="checkbox"/> Nick San         |
| <input type="checkbox"/> Gregg Middaugh | <input type="checkbox"/> Claire Tsai     | <input type="checkbox"/> Katie King       |
| <input type="checkbox"/> Mark Hiley     | <input type="checkbox"/> Toan Nguyen     | <input type="checkbox"/> Kameron DeMonnin |
| <input type="checkbox"/> Ryan Hunter    | <input type="checkbox"/> Peter Stensland | <input type="checkbox"/> _____            |
| <input type="checkbox"/> Janet Murphy   | <input type="checkbox"/> Cameron Budnick |   |

**TURN AROUND TIME:**

- |                                  |  |                                      |
|----------------------------------|--|--------------------------------------|
| <input type="checkbox"/> 1 Hour  | <input type="checkbox"/> 24 Hours            | <input type="checkbox"/> 3-5 Days    |
| <input type="checkbox"/> 2 Hours | <input checked="" type="checkbox"/> 48 Hours | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> 4 Hours |  |                                      |

**NOTE: \*\*\*Composite if positive**

SAMPLE DATA FORM			
Sample #	Material	Location	Lab
41924.000-001	Fiberglass and Plaster Finish	Pool Wall Deep End East	NVL
41924.000-002	Fiberglass and Plaster Finish	Pool Wall Deep End South	↓
41924.000-003	Fiberglass and Plaster Finish	Pool Wall Shallow End West	
41924.000-004	Fiberglass and Plaster Finish	Pool Wall Shallow End North	
41924.000-005	Fiberglass and Plaster Finish	Pool Cove North	
41924.000-006	Fiberglass and Plaster Finish	Pool Cove South	
41924.000-007	Fiberglass and Plaster Finish	Pool Deep End Floor	
41924.000-008	Fiberglass and Plaster Finish	Pool Shallow End Floor	
41924.000-009	Joint Compound*** / Gypsum Wallboard	Northeast Storage	
41924.000-010	Joint Compound*** / Gypsum Wallboard	Filter Room	
41924.000-011	Joint Compound*** / Gypsum Wallboard	Boy's Locker Room Ceiling	
41924.000-012	Yellow Carpet Mastic	Lobby	
41924.000-013	Epoxy Floor	Stairs to Boy's Locker Room	
41924.000-014	Epoxy Floor	Girl's Locker Room	
41924.000-015	White 2' x 4' Lay-in Ceiling Tile	Pool Area	
41924.000-016	White 1" Ceramic Tile and Grout	Pool Deck at Pool Edge	
41924.000-017	Orange Ceramic Tile and Grout	Boy's Locker Room Wall	
41924.000-018	Green Ceramic Tile and Grout	Girl's Locker Room Wall	

SAMPLE DATA FORM			
Sample #	Material	Location	Lab
41924.000-019	Grout at Window Frame and Concrete	Pool Deck East Interior	NVL
41924.000-020	Grout at Concrete Wall Base and Slab	Pool Deck East Interior	↓
41924.000-021	Mortar a/w Red Brick	Boy's Locker Room Wall	
41924.000-022	Mortar a/w CMU	Boy's Locker Room Wall	
41924.000-023	Wall Panel	Boy's Locker Room Shower Wall	
41924.000-024	Hard Mudded Pipe Fitting	Mechanical Basement	
41924.000-025	Hard Mudded Pipe Fitting	Mechanical Basement	
41924.000-026	Hard Mudded Pipe Fitting	Filter Room	
41924.000-027	Tank Insulation	Mechanical Basement	
41924.000-028	Tank Insulation	Mechanical Basement	
41924.000-029	Tank Insulation	Mechanical Basement	
41924.000-030	Brown Interior Door Frame Caulk	Lobby	
41924.000-031	Brown Interior Door Frame Caulk	Pool Deck East Interior	
41924.000-032	Brown Interior Door Frame Caulk	Pool Deck West Interior	
41924.000-033	Brown Interior Door Frame Caulk	Filter Room to Pool	
41924.000-034	Brown Interior Window Frame Caulk	Lobby	
41924.000-035	Brown Interior Window Frame Caulk	Pool Deck West Interior	
41924.000-036	Black Interior Window Putty	Lobby Clerestory Windows	

April 5, 2024



Ryan Hunter  
PBS Environmental - Seattle  
214 E Galer St. Suite. 300  
Seattle, WA 98102

**RE: Bulk Asbestos Fiber Analysis; NVL Batch # 2405938.00**

Client Project: 41924.000  
Location: Bainbridge Aquatic Center Renovation-Ray Williamson

Dear Mr. Hunter,

Enclosed please find test results for the 21 sample(s) submitted to our laboratory for analysis on 4/3/2024.

Examination of these samples was conducted for the presence of identifiable asbestos fibers using polarized light microscopy (PLM) with dispersion staining in accordance with **U. S. EPA 40 CFR Appendix E to Subpart E of Part 763**, Interim Method for the Determination of Asbestos in Bulk Insulation Samples and **EPA 600/R-93/116**, Method for the Determination of Asbestos in Bulk Building Materials.

For samples containing more than one separable layer of materials, the report will include findings for each layer (labeled Layer 1 and Layer 2, etc. for each individual layer). The asbestos concentration in the sample is determined by calibrated visual estimation.

For those samples with asbestos concentrations between 1 and 10 percent based on visual estimation, the EPA recommends a procedure known as point counting (NESHAPS, 40 CFR Part 61). Point counting is a statistically more accurate means of quantification for samples with low concentrations of asbestos.

The detection limit for the calibrated visual estimation is <1%, 400 point counts is 0.25% and 1000 point counts is 0.1%

Samples are archived for two weeks following analysis. Samples that are not retrieved by the client are discarded after two weeks.

Thank you for using our laboratory services. Please do not hesitate to call if there is anything further we can assist you with.

Sincerely,

A handwritten signature in black ink that reads "Hilary Crumley".

Hilary Crumley, Manager Asbestos Laboratory

The logo for NVL LABS, featuring the letters "NVL" in a large, outlined, sans-serif font, followed by "LABS" in a smaller, outlined, sans-serif font.

Testing

Lab Code: 102063-0

Enc.: Sample Results

**Phone: 206 547.0100 | Fax: 206 634.1936 | Toll Free: 1.888.NVL.LABS (685.5227)**  
**4708 Aurora Avenue North | Seattle, WA 98103-6516**



# Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: PBS Environmental - Seattle  
Address: 214 E Galer St. Suite. 300  
Seattle, WA 98102

**Batch #: 2405938.00**  
Client Project #: 41924.000  
Date Received: 4/3/2024  
Samples Received: 21  
Samples Analyzed: 21  
Method: EPA/600/R-93/116

**Attention: Mr. Ryan Hunter**  
Project Location: Bainbridge Aquatic Center Renovation-Ray Williamson

**Lab ID: 24037544      Client Sample #: 41924.000-037**

Location: Bainbridge Aquatic Center Renovation-Ray Williamson

**Layer 1 of 2      Description:** Brown hard brittle material

Non-Fibrous Materials:  
Binder/Filler, Mineral grains, Debris  
Insect parts

Other Fibrous Materials:%  
None Detected    ND

**Asbestos Type: %  
None Detected ND**

**Layer 2 of 2      Description:** Gray sandy material with debris

Non-Fibrous Materials:  
Binder/Filler, Fine grains, Mineral grains  
Debris

Other Fibrous Materials:%  
Cellulose    2%

**Asbestos Type: %  
None Detected ND**

**Lab ID: 24037545      Client Sample #: 41924.000-038**

Location: Bainbridge Aquatic Center Renovation-Ray Williamson

**Layer 1 of 1      Description:** Black soft material with debris

Non-Fibrous Materials:  
Binder/Filler, Debris

Other Fibrous Materials:%  
Polyethylene fibers    4%

**Asbestos Type: %  
None Detected ND**

**Lab ID: 24037546      Client Sample #: 41924.000-039**

Location: Bainbridge Aquatic Center Renovation-Ray Williamson

**Layer 1 of 1      Description:** Black soft/elastic material with debris

Non-Fibrous Materials:  
Binder/Filler, Debris

Other Fibrous Materials:%  
Cellulose    <1%

**Asbestos Type: %  
None Detected ND**

**Lab ID: 24037547      Client Sample #: 41924.000-040**

Location: Bainbridge Aquatic Center Renovation-Ray Williamson

**Sampled by:** Client

**Analyzed by:** Kunga Woser

**Reviewed by:** Hilary Crumley

**Date:** 04/05/2024

**Date:** 04/05/2024

Hilary Crumley, Manager Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government



# Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: PBS Environmental - Seattle  
 Address: 214 E Galer St. Suite. 300  
 Seattle, WA 98102

**Batch #: 2405938.00**  
 Client Project #: 41924.000  
 Date Received: 4/3/2024  
 Samples Received: 21  
 Samples Analyzed: 21  
 Method: EPA/600/R-93/116

**Attention: Mr. Ryan Hunter**  
 Project Location: Bainbridge Aquatic Center Renovation-Ray Williamson

**Layer 1 of 1**     **Description:** Dark gray brittle material with debris

Non-Fibrous Materials: Binder/Filler, Debris	Other Fibrous Materials:% Cellulose <1%	<b>Asbestos Type: %</b> <b>None Detected ND</b>
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**Lab ID: 24037548**     **Client Sample #: 41924.000-041**  
 Location: Bainbridge Aquatic Center Renovation-Ray Williamson

**Layer 1 of 1**     **Description:** Gray soft material with debris

Non-Fibrous Materials: Binder/Filler, Debris	Other Fibrous Materials:% None Detected ND	<b>Asbestos Type: %</b> <b>None Detected ND</b>
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**Lab ID: 24037549**     **Client Sample #: 41924.000-042**  
 Location: Bainbridge Aquatic Center Renovation-Ray Williamson

**Layer 1 of 1**     **Description:** Black soft/elastic material with debris

Non-Fibrous Materials: Binder/Filler, Debris	Other Fibrous Materials:% None Detected ND	<b>Asbestos Type: %</b> <b>None Detected ND</b>
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**Lab ID: 24037550**     **Client Sample #: 41924.000-043**  
 Location: Bainbridge Aquatic Center Renovation-Ray Williamson

**Layer 1 of 1**     **Description:** Gray brittle material with debris

Non-Fibrous Materials: Binder/Filler, Debris	Other Fibrous Materials:% Cellulose <1%	<b>Asbestos Type: %</b> <b>None Detected ND</b>
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**Lab ID: 24037551**     **Client Sample #: 41924.000-044**  
 Location: Bainbridge Aquatic Center Renovation-Ray Williamson

**Layer 1 of 2**     **Description:** Dark gray soft material with debris

Non-Fibrous Materials: Binder/Filler, Debris	Other Fibrous Materials:% Cellulose 2%	<b>Asbestos Type: %</b> <b>None Detected ND</b>
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**Sampled by:** Client  
**Analyzed by:** Kunga Woser     **Date:** 04/05/2024  
**Reviewed by:** Hilary Crumley     **Date:** 04/05/2024     Hilary Crumley, Manager Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government



# Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: PBS Environmental - Seattle  
 Address: 214 E Galer St. Suite. 300  
 Seattle, WA 98102

**Batch #: 2405938.00**  
 Client Project #: 41924.000  
 Date Received: 4/3/2024  
 Samples Received: 21  
 Samples Analyzed: 21  
 Method: EPA/600/R-93/116

**Attention: Mr. Ryan Hunter**  
 Project Location: Bainbridge Aquatic Center Renovation-Ray Williamson

<b>Layer 2 of 2</b>	<b>Description:</b> Clear soft/elastic material with debris			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Debris	Cellulose 2%		<b>None Detected ND</b>

**Lab ID: 24037552**      **Client Sample #: 41924.000-045**

Location: Bainbridge Aquatic Center Renovation-Ray Williamson

<b>Layer 1 of 1</b>	<b>Description:</b> Dark gray soft material with debris			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Debris	Cellulose <1%		<b>None Detected ND</b>

**Lab ID: 24037553**      **Client Sample #: 41924.000-046**

Location: Bainbridge Aquatic Center Renovation-Ray Williamson

<b>Layer 1 of 2</b>	<b>Description:</b> Brown soft/elastic material with paint & debris			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Paint, Debris	None Detected ND		<b>None Detected ND</b>

<b>Layer 2 of 2</b>	<b>Description:</b> Black thin brittle material with debris			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Debris	None Detected ND		<b>None Detected ND</b>

**Lab ID: 24037554**      **Client Sample #: 41924.000-047**

Location: Bainbridge Aquatic Center Renovation-Ray Williamson

<b>Layer 1 of 1</b>	<b>Description:</b> Brown soft material with debris			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Debris	Cellulose 2%		<b>None Detected ND</b>

**Lab ID: 24037555**      **Client Sample #: 41924.000-048**

Location: Bainbridge Aquatic Center Renovation-Ray Williamson

<b>Sampled by:</b> Client		
<b>Analyzed by:</b> Kunga Woser	<b>Date:</b> 04/05/2024	
<b>Reviewed by:</b> Hilary Crumley	<b>Date:</b> 04/05/2024	Hilary Crumley, Manager Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government



# Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: PBS Environmental - Seattle  
Address: 214 E Galer St. Suite. 300  
Seattle, WA 98102

**Batch #: 2405938.00**  
Client Project #: 41924.000  
Date Received: 4/3/2024  
Samples Received: 21  
Samples Analyzed: 21  
Method: EPA/600/R-93/116

**Attention: Mr. Ryan Hunter**

Project Location: Bainbridge Aquatic Center Renovation-Ray Williamson

<b>Layer 1 of 1</b>	<b>Description:</b> Gray soft material with paint & debris			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Paint, Debris	Cellulose 2%		<b>None Detected ND</b>

**Lab ID: 24037556**      **Client Sample #: 41924.000-049**  
Location: Bainbridge Aquatic Center Renovation-Ray Williamson

<b>Layer 1 of 1</b>	<b>Description:</b> Black brittle material with debris			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Debris	Cellulose 3%		<b>None Detected ND</b>

**Lab ID: 24037557**      **Client Sample #: 41924.000-050**  
Location: Bainbridge Aquatic Center Renovation-Ray Williamson

<b>Layer 1 of 1</b>	<b>Description:</b> Black brittle material with debris			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Binder/Filler, Debris	Cellulose <1%		<b>None Detected ND</b>


**Lab ID: 24037558**      **Client Sample #: 41924.000-051**  
Location: Bainbridge Aquatic Center Renovation-Ray Williamson

<b>Layer 1 of 1</b>	<b>Description:</b> Brown asphaltic fibrous material			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Asphalt/Binder, Asphaltic Particles	Cellulose 41%		<b>None Detected ND</b>

**Lab ID: 24037559**      **Client Sample #: 41924.000-052**  
Location: Bainbridge Aquatic Center Renovation-Ray Williamson

<b>Layer 1 of 1</b>	<b>Description:</b> Brown asphaltic fibrous material			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Asphalt/Binder, Asphaltic Particles	Cellulose 44%		<b>None Detected ND</b>

**Lab ID: 24037560**      **Client Sample #: 41924.000-053**  
Location: Bainbridge Aquatic Center Renovation-Ray Williamson

<b>Sampled by:</b> Client			
<b>Analyzed by:</b> Kunga Woser	<b>Date:</b> 04/05/2024		
<b>Reviewed by:</b> Hilary Crumley	<b>Date:</b> 04/05/2024	Hilary Crumley, Manager Asbestos Laboratory	

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government



# Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: PBS Environmental - Seattle  
 Address: 214 E Galer St. Suite. 300  
 Seattle, WA 98102

**Batch #: 2405938.00**  
 Client Project #: 41924.000  
 Date Received: 4/3/2024  
 Samples Received: 21  
 Samples Analyzed: 21  
 Method: EPA/600/R-93/116

**Attention: Mr. Ryan Hunter**  
 Project Location: Bainbridge Aquatic Center Renovation-Ray Williamson

<b>Layer 1 of 2</b>	<b>Description:</b> Black asphaltic material with debris			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Asphalt/Binder, Asphaltic Particles, Debris	Synthetic fibers 3%		<b>None Detected ND</b>
<b>Layer 2 of 2</b>	<b>Description:</b> Black asphaltic fibrous built-up material with debris			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Asphalt/Binder, Asphaltic Particles, Debris	Synthetic fibers 9%		<b>None Detected ND</b>
		Glass fibers 5%		

**Lab ID: 24037561**      **Client Sample #: 41924.000-054**  
 Location: Bainbridge Aquatic Center Renovation-Ray Williamson

<b>Layer 1 of 2</b>	<b>Description:</b> Silver paint with debris			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Metallic paint, Debris	Wollastonite 4%		<b>None Detected ND</b>
<b>Layer 2 of 2</b>	<b>Description:</b> Multi-layered black asphaltic material with debris			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Asphalt/Binder, Asphaltic Particles, Debris	Glass fibers 11%		<b>None Detected ND</b>
		Synthetic fibers 6%		

**Lab ID: 24037562**      **Client Sample #: 41924.000-055**  
 Location: Bainbridge Aquatic Center Renovation-Ray Williamson

<b>Layer 1 of 4</b>	<b>Description:</b> Silver paint with debris			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Metallic paint, Debris	Wollastonite 3%		<b>None Detected ND</b>
<b>Layer 2 of 4</b>	<b>Description:</b> Black asphaltic fibrous built-up material with debris			
	Non-Fibrous Materials:	Other Fibrous Materials:%		<b>Asbestos Type: %</b>
	Asphalt/Binder, Asphaltic Particles, Debris	Synthetic fibers 6%		<b>None Detected ND</b>

<b>Sampled by:</b> Client		
<b>Analyzed by:</b> Kunga Woser	<b>Date:</b> 04/05/2024	
<b>Reviewed by:</b> Hilary Crumley	<b>Date:</b> 04/05/2024	Hilary Crumley, Manager Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government



# Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: PBS Environmental - Seattle  
Address: 214 E Galer St. Suite. 300  
Seattle, WA 98102

**Batch #: 2405938.00**  
Client Project #: 41924.000  
Date Received: 4/3/2024  
Samples Received: 21  
Samples Analyzed: 21  
Method: EPA/600/R-93/116

**Attention: Mr. Ryan Hunter**

Project Location: Bainbridge Aquatic Center Renovation-Ray Williamson

		Glass fibers	5%	
<b>Layer 3 of 4</b>	<b>Description:</b> Black thin crumbly material (on wood) with debris			
	Non-Fibrous Materials:	Other Fibrous Materials:		<b>Asbestos Type: %</b>
	Binder/Filler, Fine particles, Debris	Cellulose	6%	<b>None Detected ND</b>
	Organic debris			
<b>Layer 4 of 4</b>	<b>Description:</b> Tan compressed fibrous material			
	Non-Fibrous Materials:	Other Fibrous Materials:		<b>Asbestos Type: %</b>
	Binder/Filler, Wood flakes	Cellulose	85%	<b>None Detected ND</b>

**Lab ID: 24037563**      **Client Sample #: 41924.000-056**

Location: Bainbridge Aquatic Center Renovation-Ray Williamson

Comments: Unsure of correct layer sequence.

<b>Layer 1 of 5</b>	<b>Description:</b> Silver paint			
	Non-Fibrous Materials:	Other Fibrous Materials:		<b>Asbestos Type: %</b>
	Metallic paint	Wollastonite	4%	<b>None Detected ND</b>
<b>Layer 2 of 5</b>	<b>Description:</b> Black asphaltic fibrous built-up material			
	Non-Fibrous Materials:	Other Fibrous Materials:		<b>Asbestos Type: %</b>
	Asphalt/Binder, Asphaltic Particles	Synthetic fibers	9%	<b>None Detected ND</b>
		Glass fibers	5%	
<b>Layer 3 of 5</b>	<b>Description:</b> Multi-layered black asphaltic material			
	Non-Fibrous Materials:	Other Fibrous Materials:		<b>Asbestos Type: %</b>
	Asphalt/Binder, Asphaltic Particles	Glass fibers	11%	<b>None Detected ND</b>
<b>Layer 4 of 5</b>	<b>Description:</b> Tan foamy material			
	Non-Fibrous Materials:	Other Fibrous Materials:		<b>Asbestos Type: %</b>
	Foamy material	None Detected	ND	<b>None Detected ND</b>

**Sampled by:** Client

**Analyzed by:** Kunga Woser

**Reviewed by:** Hilary Crumley

**Date:** 04/05/2024

**Date:** 04/05/2024

Hilary Crumley, Manager Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government



# Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: PBS Environmental - Seattle  
 Address: 214 E Galer St. Suite. 300  
 Seattle, WA 98102

**Batch #: 2405938.00**  
 Client Project #: 41924.000  
 Date Received: 4/3/2024  
 Samples Received: 21  
 Samples Analyzed: 21  
 Method: EPA/600/R-93/116

**Attention: Mr. Ryan Hunter**  
 Project Location: Bainbridge Aquatic Center Renovation-Ray Williamson

<b>Layer 5 of 5</b>	<b>Description:</b> Multi-layered black asphaltic material	Non-Fibrous Materials: Asphalt/Binder, Asphaltic Particles	Other Fibrous Materials:% Glass fibers 14%	<b>Asbestos Type: %</b> <b>None Detected ND</b>
<b>Lab ID: 24037564      Client Sample #: 41924.000-057</b>				
Location: Bainbridge Aquatic Center Renovation-Ray Williamson				
<b>Layer 1 of 4</b>	<b>Description:</b> Silver paint	Non-Fibrous Materials: Metallic paint	Other Fibrous Materials:% Wollastonite 3%	<b>Asbestos Type: %</b> <b>None Detected ND</b>
<b>Layer 2 of 4</b>	<b>Description:</b> Multi-layered black asphaltic material	Non-Fibrous Materials: Asphalt/Binder, Asphaltic Particles	Other Fibrous Materials:% Glass fibers 12% Synthetic fibers 5%	<b>Asbestos Type: %</b> <b>None Detected ND</b>
<b>Layer 3 of 4</b>	<b>Description:</b> Tan foamy material	Non-Fibrous Materials: Foamy material	Other Fibrous Materials:% None Detected ND	<b>Asbestos Type: %</b> <b>None Detected ND</b>
<b>Layer 4 of 4</b>	<b>Description:</b> Multi-layered black asphaltic material	Non-Fibrous Materials: Asphalt/Binder, Asphaltic Particles	Other Fibrous Materials:% Glass fibers 15%	<b>Asbestos Type: %</b> <b>None Detected ND</b>

<b>Sampled by:</b> Client	
<b>Analyzed by:</b> Kunga Woser	<b>Date:</b> 04/05/2024
<b>Reviewed by:</b> Hilary Crumley	<b>Date:</b> 04/05/2024      Hilary Crumley, Manager Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government

# ASBESTOS LABORATORY SERVICES



<b>Company</b> PBS Environmental - Seattle	<b>NVL Batch Number</b> <b>2405938.00</b>
<b>Address</b> 214 E Galer St. Suite. 300 Seattle, WA 98102	<b>TAT</b> 2 Days <b>AH</b> No
<b>Project Manager</b> Mr. Ryan Hunter	<b>Rush TAT</b>
<b>Phone</b> (206) 233-9639	<b>Due Date</b> 4/5/2024 <b>Time</b> 5:00 PM
<b>Cell</b> (484) 269-2138	<b>Email</b> ryan.hunter@pbsusa.com
	<b>Fax</b> (866) 727-0140

**Project Name/Number:** 41924.000      **Project Location:** Bainbridge Aquatic Center Renovation-Ray Williamson

**Subcategory** PLM Bulk  
**Item Code** ASB-02      EPA 600/R-93-116 Asbestos by PLM <bulk>

**Total Number of Samples** 21      **Rush Samples** \_\_\_\_\_

Lab ID	Sample ID	Description	A/R
1	24037544	41924.000-037	A
2	24037545	41924.000-038	A
3	24037546	41924.000-039	A
4	24037547	41924.000-040	A
5	24037548	41924.000-041	A
6	24037549	41924.000-042	A
7	24037550	41924.000-043	A
8	24037551	41924.000-044	A
9	24037552	41924.000-045	A
10	24037553	41924.000-046	A
11	24037554	41924.000-047	A
12	24037555	41924.000-048	A
13	24037556	41924.000-049	A
14	24037557	41924.000-050	A
15	24037558	41924.000-051	A
16	24037559	41924.000-052	A
17	24037560	41924.000-053	A
18	24037561	41924.000-054	A

	Print Name	Signature	Company	Date	Time
<b>Sampled by</b>	Client				
<b>Relinquished by</b>	Client				

Office Use Only	Print Name	Signature	Company	Date	Time
<b>Received by</b>	Rachelle Miller		NVL	4/3/24	1700
<b>Analyzed by</b>	Kunga Woser		NVL	4/5/24	
<b>Results Called by</b>					
<input type="checkbox"/> <b>Faxed</b> <input type="checkbox"/> <b>Emailed</b>					

**Special Instructions:** \_\_\_\_\_

Date: 4/3/2024  
 Time: 5:09 PM  
 Entered By: Rachelle Miller

# ASBESTOS LABORATORY SERVICES



<b>Company</b> PBS Environmental - Seattle	<b>NVL Batch Number</b> <b>2405938.00</b>
<b>Address</b> 214 E Galer St. Suite. 300 Seattle, WA 98102	<b>TAT</b> 2 Days <b>AH</b> No
<b>Project Manager</b> Mr. Ryan Hunter	<b>Rush TAT</b>
<b>Phone</b> (206) 233-9639	<b>Due Date</b> 4/5/2024 <b>Time</b> 5:00 PM
<b>Cell</b> (484) 269-2138	<b>Email</b> ryan.hunter@pbsusa.com
	<b>Fax</b> (866) 727-0140

**Project Name/Number:** 41924.000      **Project Location:** Bainbridge Aquatic Center Renovation-Ray Williamson

**Subcategory** PLM Bulk

**Item Code** ASB-02      EPA 600/R-93-116 Asbestos by PLM <bulk>

**Total Number of Samples** 21      **Rush Samples** \_\_\_\_\_

Lab ID	Sample ID	Description	A/R
19	24037562	41924.000-055	A
20	24037563	41924.000-056	A
21	24037564	41924.000-057	A

	Print Name	Signature	Company	Date	Time
<b>Sampled by</b>	Client				
<b>Relinquished by</b>	Client				

Office Use Only	Print Name	Signature	Company	Date	Time
<b>Received by</b>	Rachelle Miller		NVL	4/3/24	1700
<b>Analyzed by</b>	Kunga Woser		NVL	4/5/24	
<b>Results Called by</b>					
<input type="checkbox"/> <b>Faxed</b> <input type="checkbox"/> <b>Emailed</b>					

**Special Instructions:** \_\_\_\_\_

Date: 4/3/2024  
 Time: 5:09 PM  
 Entered By: Rachelle Miller

Project: Bainbridge Aquatic Center Renovation – Ray Williamson

Project #: 41924.000 Page 1 of 2

Analysis requested: PLM

Date: 04/03/2024

Relinqu'd by/Signature: Ryan Hunter / *Ryan Hunter*

Date/Time: 04/03/2024

Received by/Signature: Rachelle Miller / *Rachelle Miller*

Date/Time: 4/3/24 @ 1200

Email ALL INVOICES to: [seattleap@pbsusa.com](mailto:seattleap@pbsusa.com)

**E-mail results to:**

- |   |  |   |
|---|--|---|
| <input type="checkbox"/> Willem Mager           | <input type="checkbox"/> Ferman Fletcher | <input type="checkbox"/> Nick San         |
| <input type="checkbox"/> Gregg Middaugh         | <input type="checkbox"/> Claire Tsai     | <input type="checkbox"/> Katie King       |
| <input type="checkbox"/> Mark Hiley             | <input type="checkbox"/> Toan Nguyen     | <input type="checkbox"/> Kameron DeMonnin |
| <input checked="" type="checkbox"/> Ryan Hunter | <input type="checkbox"/> Peter Stensland | <input type="checkbox"/> _____            |
| <input type="checkbox"/> Janet Murphy           | <input type="checkbox"/> Cameron Budnick |   |

**TURN AROUND TIME:**

- |                                  |  |                                      |
|----------------------------------|--|--------------------------------------|
| <input type="checkbox"/> 1 Hour  | <input type="checkbox"/> 24 Hours            | <input type="checkbox"/> 3-5 Days    |
| <input type="checkbox"/> 2 Hours | <input checked="" type="checkbox"/> 48 Hours | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> 4 Hours |  |                                      |

**NOTE: \*\*\*Composite if positive**

SAMPLE DATA FORM			
Sample #	Material	Location	Lab
41924.000-037	Exterior Brick and Mortar	East Elevation	NVL
41924.000-038	Black Exterior Window Putty Patch	Roof Pool Windows	↓
41924.000-039	Black Exterior Window Putty	Roof Pool Windows	
41924.000-040	Exterior Window Frame Caulk at Rough Opening & Brick	East Elevation North	
41924.000-041	Exterior Window Frame Caulk at Metal and Wood Beam	East Elevation Central	
41924.000-042	Exterior Window Frame Caulk at Frame and Metal Base	East Elevation	
41924.000-043	Exterior Window Frame Caulk at Rough Opening and Brick	East Elevation South Side	
41924.000-044	Exterior Window Frame Caulk at Metal Column and Frame	South Elevation	
41924.000-045	Exterior Window Frame Caulk at Metal and Brick	South Elevation	
41924.000-046	Exterior Window Frame Caulk at Frame and Wood Siding	Pool Roof Windows	
41924.000-047	Exterior Window Frame Caulk at Wood Frame and Metal	Roof Lobby Windows	
41924.000-048	Gray Caulk at Roof Exhaust	Roof East Side	
41924.000-049	Exterior Door Frame Caulk at Rough Opening and Brick	East Elevation	
41924.000-050	Exterior Door Frame Caulk at Rough Opening and Brick	South Elevation	
41924.000-051	Black Felt Paper Behind Wood Siding	Roof Mech Room East	
41924.000-052	Black Felt Paper Behind Wood Siding	Roof Mech Room West	
41924.000-053	Black Asphaltic Material in Roof Drain	Roof Center Drain	
41924.000-054	Parapet Roofing	West Side	



## **APPENDIX B**

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### **AA Lead Paint Chip Sampling Information**

AA Lead Paint Chip Sample Inventory

AA Lead Paint Chip Laboratory Data Sheets

AA Lead Paint Chip Chain-of-Custody Documentation

**Bainbridge Aquatic Center Renovation - Ray Williamson Pool  
Bainbridge Island Metro Park and Recreation District**

**PBS Engineering + Environmental  
PBS Project #41924.000**

**AA LEAD PAINT CHIP SAMPLE INVENTORY**

<u>PBS Sample #</u>	<u>Paint Color / Component or Substrate</u>	<u>Sample Location</u>	<u>Results (mg/kg)</u>	<u>Results (%)</u>	<u>Lab</u>
41924.000-Pb01	White / Gypsum Wallboard / Wall	Tutor Office 6	<48	<0.0048	NVL
41924.000-Pb02	White / Concrete Masonry Unit / Wall	Pool Deck West	<49	<0.0049	NVL
41924.000-Pb03	Blue / Brick / Wall	Pool at Control Office 7	<53	<0.0053	NVL
41924.000-Pb04	White / Brick / Wall	Lobby Room 9	<46	<0.0046	NVL
41924.000-Pb05	Blue / Wood / Frame	Lobby Door	<110	<0.011	NVL
41924.000-Pb06	Blue / Metal / Frame	Filter Room Door	140	0.014	NVL
41924.000-Pb07	White / Metal / Support	Spring Board	<49	<0.0049	NVL
41924.000-Pb08	Brown / Metal / Flashing	Parapet Cap at Roof	<130	<0.013	NVL

April 2, 2024

Ryan Hunter

**PBS Environmental - Seattle**

214 E Galer St. Suite. 300

Seattle, WA 98102



**NVL Batch # 2405649.00**

**RE: Total Metal Analysis**  
**Method: EPA 7000B Lead by FAA <paint>**  
**Item Code: FAA-02**

Client Project: 41924.000

Location: Bainbridge Aquatic Center Renovation - Ray Williamson

Dear Mr. Hunter,

NVL Labs received 7 sample(s) for the said project on 4/1/2024. Preparation of these samples was conducted following protocol outlined in EPA 3051/7000B , unless stated otherwise. Analysis of these samples was performed using analytical instruments in accordance with EPA 7000B Lead by FAA <paint>. The results are usually expressed in mg/Kg and percentage (%). Test results are not blank corrected.

For recent regulation updates pertaining to current regulatory levels or permissible exposure levels, please call your local regulatory agencies for more detail.

At NVL Labs all analyses are performed under strict guidelines of the Quality Assurance Program. This report is considered highly confidential and will not be released without your approval. Samples are archived after two weeks from the analysis date. Please feel free to contact us at 206-547-0100, in case you have any questions or concerns.

Sincerely,

A handwritten signature in black ink, appearing to read 'Nick Ly', written over a white background.

Nick Ly, Technical Manager

Enc.: Sample results



Phone: 206 547.0100 | Fax: 206 634.1936 | Toll Free: 1.888.NVL.LABS (685.5227)  
4708 Aurora Avenue North | Seattle, WA 98103-6516

# Analysis Report

## Total Lead (Pb)



Client: PBS Environmental - Seattle  
 Address: 214 E Galer St. Suite. 300  
 Seattle, WA 98102

**Batch #: 2405649.00**

Matrix: Paint  
 Method: EPA 3051/7000B  
 Client Project #: 41924.000  
 Date Received: 4/1/2024  
 Samples Received: 7  
 Samples Analyzed: 7

**Attention: Mr. Ryan Hunter**

Project Location: Bainbridge Aquatic Center Renovation - Ray Williamson

Lab ID	Client Sample #	Sample Weight (g)	RL in mg/Kg	Results in mg/Kg	Results in percent
24034794	41924.000-Pb01	0.2067	48	< 48	<0.0048
24034795	41924.000-Pb02	0.2048	49	< 49	<0.0049
24034796	41924.000-Pb03	0.1875	53	< 53	<0.0053
24034797	41924.000-Pb04	0.2155	46	< 46	<0.0046
24034798	41924.000-Pb05	0.0931	110	< 110	<0.011
24034799	41924.000-Pb06	0.1601	62	140	0.014
24034800	41924.000-Pb07	0.2061	49	< 49	<0.0049

Sampled by: Client

Analyzed by: Yasuyuki Hida

Reviewed by: Nick Ly

Date Analyzed: 04/01/2024

Date Issued: 04/02/2024

Nick Ly, Technical Manager

mg/ Kg =Milligrams per kilogram

Percent = Milligrams per kilogram / 10000

Note : Method QC results are acceptable unless stated otherwise.

Unless otherwise indicated, the condition of all samples was acceptable at time of receipt.

RL = Reporting Limit

'<' = Below the reporting Limit

Bench Run No: 2024-0401-06

FAA-02

# LEAD LABORATORY SERVICES



<b>Company</b> PBS Environmental - Seattle <b>Address</b> 214 E Galer St. Suite. 300 Seattle, WA 98102 <b>Project Manager</b> Mr. Ryan Hunter <b>Phone</b> (206) 233-9639 <b>Cell</b> (484) 269-2138	<b>NVL Batch Number</b> <b>2405649.00</b> <b>TAT</b> 2 Days <b>AH</b> No <b>Rush TAT</b> <b>Due Date</b> 4/3/2024 <b>Time</b> 8:00 AM <b>Email</b> ryan.hunter@pbsusa.com <b>Fax</b> (866) 727-0140
---	--

**Project Name/Number:** 41924.000      **Project Location:** Bainbridge Aquatic Center Renovation - Ray Williamson

**Subcategory** Flame AA (FAA)  
**Item Code** FAA-02      EPA 7000B Lead by FAA <paint>

**Total Number of Samples** 7      **Rush Samples** \_\_\_\_\_

Lab ID	Sample ID	Description	A/R
1	24034794	41924.000-Pb01	A
2	24034795	41924.000-Pb02	A
3	24034796	41924.000-Pb03	A
4	24034797	41924.000-Pb04	A
5	24034798	41924.000-Pb05	A
6	24034799	41924.000-Pb06	A
7	24034800	41924.000-Pb07	A

	Print Name	Signature	Company	Date	Time
<b>Sampled by</b>	Client				
<b>Relinquished by</b>	Drop Box				

Office Use Only	Print Name	Signature	Company	Date	Time
<b>Received by</b>	Rachelle Miller		NVL	4/1/24	800
<b>Analyzed by</b>	Yasuyuki Hida		NVL	4/1/24	
<b>Results Called by</b>					
<input type="checkbox"/> <b>Faxed</b> <input type="checkbox"/> <b>Emailed</b>					

**Special Instructions:** \_\_\_\_\_

Date: 4/1/2024  
 Time: 8:48 AM  
 Entered By: Kelly AuVu



April 4, 2024

Ryan Hunter

**PBS Environmental - Seattle**

214 E Galer St. Suite. 300

Seattle, WA 98102



**NVL Batch # 2405939.00**

**RE: Total Metal Analysis**  
**Method: EPA 7000B Lead by FAA <paint>**  
**Item Code: FAA-02**

Client Project: 41924.000

Location: Bainbridge Aquatic Center Renovation-Ray Williamson

Dear Mr. Hunter,

NVL Labs received 1 sample(s) for the said project on 4/3/2024. Preparation of these samples was conducted following protocol outlined in EPA 3051/7000B , unless stated otherwise. Analysis of these samples was performed using analytical instruments in accordance with EPA 7000B Lead by FAA <paint>. The results are usually expressed in mg/Kg and percentage (%). Test results are not blank corrected.

For recent regulation updates pertaining to current regulatory levels or permissible exposure levels, please call your local regulatory agencies for more detail.

At NVL Labs all analyses are performed under strict guidelines of the Quality Assurance Program. This report is considered highly confidential and will not be released without your approval. Samples are archived after two weeks from the analysis date. Please feel free to contact us at 206-547-0100, in case you have any questions or concerns.

Sincerely,

A handwritten signature in black ink, appearing to read 'Nick Ly', written over a white background.

Nick Ly, Technical Manager

Enc.: Sample results



Phone: 206 547.0100 | Fax: 206 634.1936 | Toll Free: 1.888.NVL.LABS (685.5227)  
4708 Aurora Avenue North | Seattle, WA 98103-6516

# Analysis Report

## Total Lead (Pb)



Client: PBS Environmental - Seattle  
Address: 214 E Galer St. Suite. 300  
Seattle, WA 98102

**Batch #: 2405939.00**

Matrix: Paint  
Method: EPA 3051/7000B  
Client Project #: 41924.000  
Date Received: 4/3/2024  
Samples Received: 1  
Samples Analyzed: 1

**Attention: Mr. Ryan Hunter**

Project Location: Bainbridge Aquatic Center Renovation-Ray Williamson

Lab ID	Client Sample #	Sample Weight (g)	RL in mg/Kg	Results in mg/Kg	Results in percent
24037565	41924.000-Pb08	0.0399	130	< 130	<0.013

**Comments:** Small sample size (<0.05g)

Sampled by: Client

Analyzed by: Yasuyuki Hida

Reviewed by: Nick Ly

Date Analyzed: 04/04/2024

Date Issued: 04/04/2024

A handwritten signature in black ink, appearing to read 'Nick Ly', is written over a horizontal line.

Nick Ly, Technical Manager

mg/ Kg =Milligrams per kilogram

Percent = Milligrams per kilogram / 10000

Note : Method QC results are acceptable unless stated otherwise.

Unless otherwise indicated, the condition of all samples was acceptable at time of receipt.

RL = Reporting Limit

'<' = Below the reporting Limit

Bench Run No: 2024-0404-01

FAA-02

# LEAD LABORATORY SERVICES



<b>Company</b> PBS Environmental - Seattle <b>Address</b> 214 E Galer St. Suite. 300 Seattle, WA 98102 <b>Project Manager</b> Mr. Ryan Hunter <b>Phone</b> (206) 233-9639 <b>Cell</b> (484) 269-2138	<b>NVL Batch Number</b> <b>2405939.00</b> <b>TAT</b> 2 Days <b>AH</b> No <b>Rush TAT</b> <b>Due Date</b> 4/5/2024 <b>Time</b> 5:00 PM <b>Email</b> ryan.hunter@pbsusa.com <b>Fax</b> (866) 727-0140
---	--

**Project Name/Number:** 41924.000      **Project Location:** Bainbridge Aquatic Center Renovation-Ray Williamson

**Subcategory** Flame AA (FAA)  
**Item Code** FAA-02      EPA 7000B Lead by FAA <paint>

**Total Number of Samples**   1        **Rush Samples** \_\_\_\_\_

	Lab ID	Sample ID	Description	A/R
1	24037565	41924.000-Pb08		A

	Print Name	Signature	Company	Date	Time
<b>Sampled by</b>	Client				
<b>Relinquished by</b>	Client				

Office Use Only	Print Name	Signature	Company	Date	Time
<b>Received by</b>	Rachelle Miller		NVL	4/3/24	1700
<b>Analyzed by</b>	Yasuyuki Hida		NVL	4/4/24	
<b>Results Called by</b>					
<input type="checkbox"/> <b>Faxed</b> <input type="checkbox"/> <b>Emailed</b>					

**Special Instructions:** \_\_\_\_\_

Date: 4/3/2024  
 Time: 5:16 PM  
 Entered By: Rachelle Miller



## **APPENDIX C**

---

### **PCB Sampling Information**

PCB Sample Inventory

PCB Laboratory Data Sheets

PCB Chain-of-Custody Documentation

**Bainbridge Aquatic Center Renovation - Ray Williamson Pool  
Bainbridge Island Metro Park and Recreation District**

**PCB SAMPLE INVENTORY**

<u>PBS Sample #</u>	<u>Material</u>	<u>Sample Location</u>	<u>Analyte</u>	<u>Lab Results (mg/kg)</u>	<u>Lab</u>
41924.000-PCB01	Interior Door Frame Caulk	East Interior	Aroclor-1016	<1.2	NVL
			Aroclor-1221	<1.2	
			Aroclor-1232	<1.2	
			Aroclor-1242	<1.2	
			Aroclor-1248	<1.2	
			Aroclor-1254	<1.2	
			Aroclor-1260	<1.2	
			PCB, Total	<1.2	
41924.000-PCB02	Exterior Window Frame Caulk @ Rough Opening and Brick	East Elevation - South	Aroclor-1016	<1.1	NVL
			Aroclor-1221	<1.1	
			Aroclor-1232	<1.1	
			Aroclor-1242	<1.1	
			Aroclor-1248	<1.1	
			Aroclor-1254	1.6	
			Aroclor-1260	<1.1	
			PCB, Total	1.6	
41924.000-PCB03	Exterior Window Frame Caulk at Metal Column and Frame	South Elevation	Aroclor-1016	<19	NVL
			Aroclor-1221	<19	
			Aroclor-1232	<19	
			Aroclor-1242	<19	
			Aroclor-1248	<19	
			Aroclor-1254	<19	
			Aroclor-1260	<19	
			PCB, Total	<19	

**mg/kg = Milligrams per kilogram  
< = Less than the Limit of Detection**

**Bainbridge Aquatic Center Renovation - Ray Williamson Pool  
Bainbridge Island Metro Park and Recreation District**

**PBS Engineering + Environmental  
PBS Project #41924.000**

**PCB SAMPLE INVENTORY**

<u>PBS Sample #</u>	<u>Material</u>	<u>Sample Location</u>	<u>Analyte</u>	<u>Lab Results (mg/kg)</u>	<u>Lab</u>
41924.000-PCB04	Exterior Door Frame Caulk at Rough Opening and Brick	East Elevation	Aroclor-1016	<0.76	NVL
			Aroclor-1221	<0.76	
			Aroclor-1232	<0.76	
			Aroclor-1242	<0.76	
			Aroclor-1248	<0.76	
			Aroclor-1254	<0.76	
			Aroclor-1260	<0.76	
			PCB, Total	<0.76	

April 10, 2024

Ryan Hunter

**PBS Environmental - Seattle**

214 E Galer St. Suite. 300  
Seattle, WA 98102



**NVL Batch # 2405942.00**

**RE: Organics PCB**  
**Method: 8082 PCB Aroclors <Bulk>**  
**Item Code: ORG-05**

Client Project: 41924.000

Location: Bainbridge Aquatic Center Renovation-Ray Williamson

Dear Mr. Hunter,

Enclosed please find test results for samples submitted to our laboratory for analysis. Preparation and analysis of these samples were conducted in accordance with published industry standards and methods specified on the attached analytical report.

The content of this package consists of the following:

- Case Narrative & Definition of Data Qualifiers
- Analytical Test Results
- Applicable QC Summary
- Client Chain-of-Custody (CoC)
- NVL Receiving Record

The report is considered highly confidential and will not be released without your approval. Samples are archived for two weeks following analysis. Samples that are not retrieved by the client will be discarded after two weeks.

Thank you for using our laboratory services. If you need further assistance, please contact us at 206-547-0100 or 1-888-NVLLABS.

Sincerely,

Nick Ly, Technical Manager

Enc.: Sample results



## **NVL Batch # 2405942.00**

### **Case Narrative:**

The following summarizes samples received on date as shown on the accompanied Chain of custody by NVL Laboratories, Inc. from PBS Environmental - Seattle for Project Number 41924.000. Samples were logged in for PCB analysis per client request using both customer sample ID's and laboratory assigned ID's as listed on the Chain-of-Custody (CoC). All samples as received were processed and analyzed within specified turnaround time without any abnormalities and deviations that may affect the analytical results. All quality control requirements were acceptable unless stated otherwise. The conditions of all samples were acceptable at time of receipt and all samples submitted with this batch were analyzed unless stated otherwise on the CoC.

Test Results are reported in milligrams per kilogram (mg/kg) for PCB samples as shown on the analytical reports.



**NVL Batch # 2405942.00**

### **Definition Appendix**

#### **Terms**

% Rec	Percent recovery.
<	Below Reporting Limit(RL) or Limit of Quantitation(LoQ) of the instrument.
B	Blank contamination. The recorded results is associated with a contaminated blank.
DF	Dilution Factor
J	The reported concentration is an estimated value because something may be present in the sample that interfered with the analysis.
J1	The reported concentration is an estimated value because the laboratory control sample (LCS) is out of control limits.
J2	The reported concentration is an estimated value because the percent recovery for matrix spike is out of control limits.
J3	The reported concentration is an estimated value because the relative percent difference(RPD) for duplicate analysis is out of control limits.
J4	Percent recovery is outside of established control limits.
LCS	Laboratory Control Sample.
LFS	Laboratory Fortified Spike
Limits	The upper and lower control limits for spike recoveries.
LN	Quality control sample is outside of control limits. This analyte was not detected in the sample.
LOQ	Limit of quantitation( same as RL)
mg/kg	Milligrams per kilogram.
ND	Analyte not detected or below the reporting limit of the instrument or methodology



**NVL Batch # 2405942.00**

### **Definition Appendix**

#### **Terms**

PPM	Parts per Million.
QC Batch Group	Quality Control Batch Group. The entity that links analytical results and supporting quality control results.
R	The data are not reliable due to possible contamination or loss of material during preparation or analysis. Re-sampling and reanalysis are necessary for verification.
RL	Reporting Limit. The minimum concentration that can be quantified under routine operating conditions.
RPD	Relative Percent Difference. The relative difference between duplicate results( matrix spike, blank spike, or samples duplicate) expressed as a percentage.
RPD Limit	The maximum RPD allowed for a set of duplicate measurements(see RPD).
SSMI	Surrogate has matrix interference.
Spike Conc	The measured concentration, in sample basis units, of a spiked sample.
SURR-ND	Surrogate was not detected due to matrix interference or dilution.
ug/m <sup>3</sup>	Micrograms per cubic meter.
ug/100cm <sup>2</sup>	Micrograms per hundred square centimeter.











## Quality Control Results

<b>Client Project #: 41924.000</b>	<b>Batch #: 2405942.00</b>
	<b>Project Manager: Mr. Ryan Hunter</b>

Preparation Method: EPA 3546	Analysis Method: EPA 8082
Preparation Date: 4/4/2024	Analysis Description: Polychlorinated Biphenyls by Gas Chromatography

**Blank: 2405942**

Analyte	Blank Results	Units	DF	RL	Control Limit	Qualifiers
Aroclor-1016	ND	mg/Kg	1	1.00	1.00	
Aroclor-1221	ND	mg/Kg	1	1.00	1.00	
Aroclor-1232	ND	mg/Kg	1	1.00	1.00	
Aroclor-1242	ND	mg/Kg	1	1.00	1.00	
Aroclor-1248	ND	mg/Kg	1	1.00	1.00	
Aroclor-1254	ND	mg/Kg	1	1.00	1.00	
Aroclor-1260	ND	mg/Kg	1	1.00	1.00	
<b>PCBs, Total</b>	<b>ND</b>	<b>mg/Kg</b>	<b>1</b>			
<i>Surrogates:</i>					<b>% Rec</b>	
Tetrachloro-m-xylene			1		87	40-140
Decachlorobiphenyl			1		110	40-140

**Lab Control Sample: LCS 1254-2405942**

Analyte	Blank Spike Results	Units	DF	Spike Conc	% Rec	Limits	Qualifiers
Aroclor-1254	17	mg/Kg	1	20.00	85	40-140	
<i>Surrogates:</i>							
Tetrachloro-m-xylene			1		92	40-140	
Decachlorobiphenyl			1		110	40-140	

**Lab Control Sample: LCS 1016+1260-2405942**  
**Lab Control Sample Duplicate: LCS Dup 1016+1260**

Analyte	Blank Spike Results	Units	DF	Spike Conc	% Rec	Limits	RPD %	RPD Limit	Qualifiers
Aroclor-1016	15	mg/Kg	1	20.00	75	40-140			
	15			20.00	75	40-140	5	50%	
Aroclor-1260	18	mg/Kg	1	20.00	90	40-140			
	18			20.00	90	40-140	2	50%	
<i>Surrogates:</i>									
Tetrachloro-m-xylene			1		92	40-140			
					81	40-140			
Decachlorobiphenyl			1		130	40-140			
					110	40-140			

**\* Recovery outside of control limits**



## Surrogate Recovery Summary Report

**Client** PBS Environmental - Seattle

**Batch #** 2405942.00

**Project** 41924.000

Customer Sample ID	Lab Sample ID	Analyte	Recovery	Limits
41924.000-PCB01	24037590	Decachlorobiphenyl	110%	40-140
41924.000-PCB01	24037590	Tetrachloro-m-xylene	95%	40-140
41924.000-PCB02	24037591	Decachlorobiphenyl	95%	40-140
41924.000-PCB02	24037591	Tetrachloro-m-xylene	75%	40-140
41924.000-PCB03	24037592	Decachlorobiphenyl	100%	40-140
41924.000-PCB03	24037592	Tetrachloro-m-xylene	68%	40-140
41924.000-PCB04	24037593	Decachlorobiphenyl	95%	40-140
41924.000-PCB04	24037593	Tetrachloro-m-xylene	82%	40-140

\*Recovery outside of the limits



NVL Batch # 2405942.00

### INITIAL AND CONTINUING CALIBRATION VERIFICATION

Sample	Analyzed	Analyte	Target	Solution Conc	Unit	% Rec	Limits
ICV-1016	4/3/2024	Aroclor-1016	5.0	4.83	ug/mL	97	85-115
ICV-1254	4/3/2024	Aroclor-1254	5.0	5.04	ug/mL	101	85-115
ICV-1260	4/3/2024	Aroclor-1260	5.0	5.38	ug/mL	108	85-115
CCV1-1016	4/3/2024	Aroclor-1016	5.0	4.80	ug/mL	96	80-120
CCV1-1254	4/3/2024	Aroclor-1254	5.0	4.46	ug/mL	89	80-120
CCV1-1260	4/3/2024	Aroclor-1260	5.0	4.52	ug/mL	90	80-120
CCV2-1016	4/3/2024	Aroclor-1016	5.0	5.38	ug/mL	108	80-120
CCV2-1254	4/3/2024	Aroclor-1254	5.0	5.16	ug/mL	103	80-120
CCV2-1260	4/3/2024	Aroclor-1260	5.0	5.24	ug/mL	105	80-120
CCV3-1016	4/3/2024	Aroclor-1016	5.0	5.27	ug/mL	105	80-120
CCV3-1254	4/3/2024	Aroclor-1254	5.0	4.96	ug/mL	99	80-120
CCV3-1260	4/3/2024	Aroclor-1260	5.0	5.15	ug/mL	103	80-120
CCV4-1016	4/3/2024	Aroclor-1016	5.0	5.52	ug/mL	110	80-120
CCV4-1254	4/3/2024	Aroclor-1254	5.0	5.14	ug/mL	103	80-120
CCV4-1260	4/3/2024	Aroclor-1260	5.0	5.22	ug/mL	104	80-120

% Rec - Percent recovery

\* Percent recovery not within control limits

# ORGANICS LABORATORY SERVICES



<b>Company</b> PBS Environmental - Seattle	<b>NVL Batch Number</b> <b>2405942.00</b>
<b>Address</b> 214 E Galer St. Suite. 300 Seattle, WA 98102	<b>TAT</b> 5 Days <b>AH</b> No
<b>Project Manager</b> Mr. Ryan Hunter	<b>Rush TAT</b>
<b>Phone</b> (206) 233-9639	<b>Due Date</b> 4/10/2024 <b>Time</b> 5:00 PM
<b>Cell</b> (484) 269-2138	<b>Email</b> ryan.hunter@pbsusa.com
	<b>Fax</b> (866) 727-0140

**Project Name/Number:** 41924.000      **Project Location:** Bainbridge Aquatic Center Renovation-Ray Williamson

**Subcategory** Quantitative analysis

**Item Code** ORG-05      8082 PCB Aroclors <Bulk>

**Total Number of Samples** 4      **Rush Samples** \_\_\_\_\_

Lab ID	Sample ID	Description	A/R
1	24037590	41924.000-PCB01	A
2	24037591	41924.000-PCB02	A
3	24037592	41924.000-PCB03	A
4	24037593	41924.000-PCB04	A

	Print Name	Signature	Company	Date	Time
<b>Sampled by</b>	Client				
<b>Relinquished by</b>	Client				

Office Use Only	Print Name	Signature	Company	Date	Time
<b>Received by</b>	Rachelle Miller		NVL	4/3/24	1700
<b>Analyzed by</b>	Evelyn Ahulu		NVL	4/4/24	
<b>Results Called by</b>					
<input type="checkbox"/> <b>Faxed</b> <input type="checkbox"/> <b>Emailed</b>					

**Special Instructions:** \_\_\_\_\_

Date: 4/3/2024  
 Time: 5:26 PM  
 Entered By: Rachelle Miller



Project: Bainbridge Aquatic Center Renovation – Ray Williamson

Project #: 41924.000 Page 1 of 1

Analysis requested: EPA 8082 – PCB Bulk

Date: 04/03/2024

Relinqu'd by/Signature: Ryan Hunter / *Ryan Hunter*

Date/Time: 04/03/2024

Received by/Signature: Rachelle Miller / *Rachelle Miller*

Date/Time: 4/3/24 @ 1700

Email ALL INVOICES to: [seattleap@pbsusa.com](mailto:seattleap@pbsusa.com)

E-mail results to:

- Willem Mager
- Gregg Middaugh
- Mark Hiley
- Ryan Hunter
- Janet Murphy

- Ferman Fletcher
- Claire Tsai
- Toan Nguyen
- Peter Stensland
- Cameron Budnick

- Nick San
- Katie King
- Kameron DeMonnin
- \_\_\_\_\_

TURN AROUND TIME:

- 1 Hour
- 2 Hours
- 4 Hours

- 24 Hours
- 48 Hours

- 5 Day
- Other \_\_\_\_\_

SAMPLE DATA FORM

Sample #	Material	Location	Lab
41924.000-PCB01	Interior Door Frame Caulk	East Interior	NVL
41924.000-PCB02	Exterior Window Frame Caulk @ Rough Opening and Brick	East Elevation - South	↓
41924.000-PCB03	Exterior Window Frame Caulk at Metal Column and Frame	South Elevation	
41924.000-PCB04	Exterior Rood Frame Caulk at Rough Opening and Brick	East Elevation	

## **APPENDIX D**

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### **Metals in Masonry Components Sampling Information**

RCRA 8 Sample Inventory

RCRA 8 Laboratory Data Sheets

RCRA 8 Chain-of-Custody Documentation

**Bainbridge Aquatic Center Renovation - Ray Williamson Pool  
Bainbridge Island Metro Park and Recreation District**

**PBS Engineering + Environmental  
PBS Project #41924.000**

**RCRA SAMPLE INVENTORY**

<u>PBS Sample #</u>	<u>Material</u>	<u>Sample Location</u>	<u>Analyte</u>	<u>Lab Results (mg/kg)</u>	<u>Lab</u>
41924.000-RCRA01	Mortar associated with Brick	East Elevation	Arsenic	47.5	FA
			Barium	91.1	
			Cadmium	0.0427	
			Chromium	15.8	
			Lead	6.33	
			Mercury	ND	
			Selenium	ND	
			Silver	0.0222	



3600 Fremont Ave. N.  
Seattle, WA 98103  
T: (206) 352-3790  
F: (206) 352-7178  
info@fremontanalytical.com

**PBS Engineering & Environmental**

Ryan Hunter  
214 E Galer St. Suite 300  
Seattle, WA 98102

**RE: Bainbridge Aquatic Center Renovation - Ray Williamson**  
**Work Order Number: 2404100**

April 11, 2024

**Attention Ryan Hunter:**

Fremont Analytical, Inc, an Alliance Technical Group company, received 1 sample(s) on 4/4/2024 for the analyses presented in the following report.

***Total Metals by EPA Method 6020***

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed according to our accredited Quality Assurance program. Please contact the laboratory if you should have any questions about the results.

Please note, while the appearance of our logo and branding will update, our commitment to accuracy, speed, and customer service remain values celebrated and shared by Alliance Technical Group. Thank you for the opportunity to serve you.

Sincerely,

Brianna Barnes  
Project Manager

*DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.4 for Environmental Testing  
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing  
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910*

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Original

[www.fremontanalytical.com](http://www.fremontanalytical.com)



Date: 04/11/2024

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**CLIENT:** PBS Engineering & Environmental  
**Project:** Bainbridge Aquatic Center Renovation - Ray  
**Work Order:** 2404100

---

## Work Order Sample Summary

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Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2404100-001	41924.000-RCRA01	04/04/2024 12:00 AM	04/04/2024 8:23 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

**CLIENT:** PBS Engineering & Environmental  
**Project:** Bainbridge Aquatic Center Renovation - Ray Williamson

---

**I. SAMPLE RECEIPT:**

Samples receipt information is recorded on the attached Sample Receipt Checklist.

**II. GENERAL REPORTING COMMENTS:**

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

**III. ANALYSES AND EXCEPTIONS:**

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

### Qualifiers:

- \* - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

### Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- DUP - Sample Duplicate
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MCL - Maximum Contaminant Level
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- REP - Sample Replicate
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



**Client:** PBS Engineering & Environmental

**Collection Date:** 4/4/2024

**Project:** Bainbridge Aquatic Center Renovation - Ray Williamson

**Lab ID:** 2404100-001

**Matrix:**

**Client Sample ID:** 41924.000-RCRA01

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
----------	--------	----	------	-------	----	---------------

**Total Metals by EPA Method 6020**

Batch ID: 43525

Analyst: ME

Arsenic	47.5	0.252		mg/Kg	1	4/10/2024 2:51:00 PM
Barium	91.1	0.504		mg/Kg	1	4/10/2024 2:51:00 PM
Cadmium	0.0427	0.0202		mg/Kg	1	4/10/2024 2:51:00 PM
Chromium	15.8	0.252		mg/Kg	1	4/10/2024 2:51:00 PM
Lead	6.33	1.01		mg/Kg	1	4/10/2024 2:51:00 PM
Mercury	ND	0.202		mg/Kg	1	4/10/2024 2:51:00 PM
Selenium	ND	1.01		mg/Kg	1	4/10/2024 2:51:00 PM
Silver	0.0222	0.0202		mg/Kg	1	4/10/2024 2:51:00 PM

**Work Order:** 2404100  
**CLIENT:** PBS Engineering & Environmental  
**Project:** Bainbridge Aquatic Center Renovation - Ray

**QC SUMMARY REPORT**  
**Total Metals by EPA Method 6020**

Sample ID: <b>MB-43525</b>		SampType: <b>MBLK</b>		Units: <b>mg/Kg</b>		Prep Date: <b>4/10/2024</b>		RunNo: <b>90893</b>			
Client ID: <b>MBLKS</b>		Batch ID: <b>43525</b>				Analysis Date: <b>4/10/2024</b>		SeqNo: <b>1895282</b>			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	0.258									
Barium	ND	0.517									
Cadmium	ND	0.0207									
Chromium	ND	0.258									
Lead	ND	1.03									
Mercury	ND	0.207									
Selenium	ND	1.03									
Silver	ND	0.0207									

Sample ID: <b>LCS-43525</b>		SampType: <b>LCS</b>		Units: <b>mg/Kg</b>		Prep Date: <b>4/10/2024</b>		RunNo: <b>90893</b>			
Client ID: <b>LCSS</b>		Batch ID: <b>43525</b>				Analysis Date: <b>4/10/2024</b>		SeqNo: <b>1895283</b>			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	39.5	0.244	39.06	0	101	80	120				
Barium	39.0	0.488	39.06	0	99.9	80	120				
Cadmium	2.03	0.0195	1.953	0	104	80	120				
Chromium	41.6	0.244	39.06	0	106	80	120				
Lead	20.7	0.977	19.53	0	106	80	120				
Mercury	1.00	0.195	0.9766	0	103	80	120				
Selenium	4.04	0.977	3.906	0	103	80	120				
Silver	2.00	0.0195	1.953	0	102	80	120				

Sample ID: <b>2404135-001AMS</b>		SampType: <b>MS</b>		Units: <b>mg/Kg-dry</b>		Prep Date: <b>4/10/2024</b>		RunNo: <b>90893</b>			
Client ID: <b>BATCH</b>		Batch ID: <b>43525</b>				Analysis Date: <b>4/10/2024</b>		SeqNo: <b>1895286</b>			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	62.7	0.342	54.74	5.464	105	75	125				
Barium	156	0.684	54.74	86.49	127	75	125				S
Cadmium	4.12	0.0274	2.737	1.099	110	75	125				
Chromium	81.8	0.342	54.74	20.36	112	75	125				
Lead	224	1.37	27.37	168.9	201	75	125				ES

**Work Order:** 2404100  
**CLIENT:** PBS Engineering & Environmental  
**Project:** Bainbridge Aquatic Center Renovation - Ray

**QC SUMMARY REPORT**  
**Total Metals by EPA Method 6020**

Sample ID: <b>2404135-001AMS</b>	SampType: <b>MS</b>	Units: <b>mg/Kg-dry</b>	Prep Date: <b>4/10/2024</b>	RunNo: <b>90893</b>							
Client ID: <b>BATCH</b>	Batch ID: <b>43525</b>		Analysis Date: <b>4/10/2024</b>	SeqNo: <b>1895286</b>							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	1.82	0.274	1.368	0.2384	115	75	125				
Selenium	6.24	1.37	5.474	0.5060	105	75	125				
Silver	3.20	0.0274	2.737	0.2368	108	75	125				

**NOTES:**

S - Spiked amount was low relative to sample concentration. Outlying spike recoveries may be expected.

Sample ID: <b>2404135-001AMSD</b>	SampType: <b>MSD</b>	Units: <b>mg/Kg-dry</b>	Prep Date: <b>4/10/2024</b>	RunNo: <b>90893</b>							
Client ID: <b>BATCH</b>	Batch ID: <b>43525</b>		Analysis Date: <b>4/10/2024</b>	SeqNo: <b>1895287</b>							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	58.2	0.314	50.17	5.464	105	75	125	62.71	7.54	20	
Barium	159	0.627	50.17	86.49	145	75	125	156.1	2.13	20	S
Cadmium	3.91	0.0251	2.509	1.099	112	75	125	4.122	5.24	20	
Chromium	72.9	0.314	50.17	20.36	105	75	125	81.76	11.4	20	
Lead	215	1.25	25.09	168.9	183	75	125	224.0	4.20	20	ES
Mercury	1.63	0.251	1.254	0.2384	111	75	125	1.816	10.6	20	
Selenium	5.84	1.25	5.017	0.5060	106	75	125	6.237	6.53	20	
Silver	2.93	0.0251	2.509	0.2368	107	75	125	3.205	8.88	20	

**NOTES:**

S - Spiked amount was low relative to sample concentration. Outlying spike recoveries may be expected.

Client Name: PBS	Work Order Number: 2404100
Logged by: Morgan Wilson	Date Received: 4/4/2024 8:24:00 AM

**Chain of Custody**

1. Is Chain of Custody complete? Yes  No  Not Present
2. How was the sample delivered? Client

**Log In**

3. Custody Seals present on shipping container/cooler?  
(Refer to comments for Custody Seals not intact) Yes  No  Not Present
4. Was an attempt made to cool the samples? Yes  No  NA
5. Were all items received at a temperature of >2°C to 6°C \* Unknown prior to receipt. Yes  No  NA
6. Sample(s) in proper container(s)? Yes  No
7. Sufficient sample volume for indicated test(s)? Yes  No
8. Are samples properly preserved? Yes  No
9. Was preservative added to bottles? Yes  No  NA
10. Is there headspace in the VOA vials? Yes  No  NA
11. Did all samples containers arrive in good condition(unbroken)? Yes  No
12. Does paperwork match bottle labels? Yes  No
13. Are matrices correctly identified on Chain of Custody? Yes  No
14. Is it clear what analyses were requested? Yes  No
15. Were all hold times (except field parameters, pH e.g.) able to be met? Yes  No

**Special Handling (if applicable)**

16. Was client notified of all discrepancies with this order? Yes  No  NA

Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

17. Additional remarks:

**Item Information**

Item #	Temp °C
Sample	17.9

\* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C



---

**APPENDIX E**  
**Certification**

THIS IS TO CERTIFY THAT

**RYAN HUNTER**

**HAS SUCCESSFULLY COMPLETED THE TRAINING COURSE**

for

**ONLINE AHERA ASBESTOS INSPECTOR REFRESHER**

In accordance with TSCA Title II, Part 763, Subpart E, Appendix C of 40 CFR

Course Date: 03/05/2024

Course Location: Online

Certificate: IRO-24-7254B



**CCB #SRA0615 4-Hr Training**

4-Hour Online AHERA Inspector Refresher Training; AHERA is the Asbestos Hazard Emergency Response Act enacting Title II of Toxic Substance Control Act (TSCA)

**Expiration Date:** 03/05/2025

For verification of the authenticity of this certificate contact:  
PBS Engineering and Environmental Inc.  
4412 S Corbett Avenue  
Portland, OR 97239  
503.248.1939

A handwritten signature in black ink that reads "Andy Fridley".

Andy Fridley, Instructor

**SECTION 03 01 23**  
**EMBEDDED GALVANIC ANODES**

**PART 1 – GENERAL**

**1.01 SECTION INCLUDES**

- A. Installation of Anode Type IA Classic - galvanic anodes embedded within concrete repairs to provide corrosion control.
- B. Galvanic anodes will be installed in concrete patch repair locations where rust and pitting on exposed reinforcing steel is present.

**1.02 RELATED SECTIONS**

- A. Section 03 01 30 – Surface Preparation for Overlay.
- B. Section 03 01 30.71 – Concrete Rehabilitation.
- C. Section 03 20 00 – Concrete Reinforcement.
- D. Section 03 30 00 – Cast-in-Place Concrete.

**1.03 SUMMARY**

- A. This Section includes furnishing all labor, tools, materials, equipment and services necessary to properly install embedded galvanic anodes.
- B. Embedded galvanic anodes are designed to provide localized corrosion protection. When placed at the appropriate spacing along the perimeter of concrete patches or along the interface between new/existing concrete, the anodes mitigate active corrosion and the formation of new corrosion sites in the adjacent existing concrete.

**1.04 REFERENCES**

- A. ACI Guideline No. 222 – Corrosion of Metals in Concrete.
- B. ACI Repair Application Procedure (RAP) Bulletin 8 – Installation of Embedded Galvanic Anodes (2010).
- C. ACI 562 – Code Requirements for Evaluation, Repair, Rehabilitation of Concrete Buildings.
- D. ICRI Guideline 310.1R Guide for Surface Preparation for the Repair of Deteriorated Concrete resulting from Reinforcing Steel Corrosion.
- E. ASTM B418-12 – Standard Specification for Cast and Wrought Galvanic Zinc Anodes.
- F. ISO 12696 – Cathodic Protection of Steel in Concrete.

- G. ASTM C 309 Curing Compounds for Concrete.

#### **1.05 MANUFACTURER EXTENDED LIMITED WARRANTY**

- A. Contractor shall provide a Limited Warranty with a notarized signature from a corporate officer of the anode manufacturer.
- B. The Limited Warranty shall state the following:
  - 1. The published anode spacing guidelines for anode size and spacing are based on an estimated 10–30-year anode service life.
  - 2. The galvanic anodes will remain electrochemically active and produce galvanic current in relation to the environment in which it is installed for a minimum of 5 years from the date of anode installation.
  - 3. The anode unit, including its constituents, does not include substances that may cause adverse effects to concrete or reinforcing steel and will not contribute to reinforcing steel corrosion damage over the life of the structure.
  - 4. The galvanic anodes meet all building and repair code requirements.

### **PART 2 – PRODUCTS**

#### **2.01 EMBEDDED GALVANIC ANODES**

- A. Embedded galvanic anodes in concrete patch repairs shall be Anode Type 1A Class P with the following nominal dimensions: 2.6 in. diameter by 1.2 in. deep. The anodes shall be pre-manufactured with a nominal 60 grams of zinc in compliance with ASTM B418 Type II cast around a pair of uncoated, non-galvanized steel tie wires and encased in a highly alkaline cementitious shell with a pH of 14 or greater.
- B. Placed in drilled holes embedded galvanic anodes shall be Anode Type 2A Class C with the following nominal dimensions: 1 3/4 x 2 1/2 in. or 1 3/4 x 4 in. as indicated on the drawings. The anode units shall be pre-manufactured with zinc in compliance with ASTM B418 Type II cast around an uncoated, non-galvanized steel lead wire and encased in a highly alkaline cementitious shell with a pH of 14 or greater.
- C. The anode unit shall contain no intentionally added chloride, bromide or other constituents that are corrosive to reinforcing steel as per ACI 222R. Embedded galvanic anodes shall be Galvashield® XP and CC available from Vector Corrosion Technologies ([www.vector-corrosion.com](http://www.vector-corrosion.com)) USA (813) 830-7566, Canada (204) 489-9611 or approved equal.
- D. Application for galvanic anode approved equals shall include verification of the following information:
  - 1. The zinc anode is alkali-activated with an alkaline cementitious shell with a pH of 14 or greater.
  - 2. Contain no intentionally added constituents corrosive to reinforcing steel or detrimental to concrete, e.g. chloride, bromide, etc.
  - 3. Field installations showing that the anodes have achieved a minimum of 10 years service.
  - 4. A minimum of ten projects of similar size and application.

5. Anode units shall be supplied with solid zinc core (ASTM B418) cast around a uncoated non-galvanized, non-spliced steel wire and twisting to provide a durable steel-to-steel connection between the tie wire and reinforcement.
6. Third party product evaluation, such as from Concrete Innovations Appraisal Service, BBA, etc.

## **2.02 REPAIR MATERIALS**

- A. Use an ionically conductive, cement-based repair mortar or concrete. Non-conductive repair materials such as epoxy, urethane, or magnesium phosphate shall not be permitted. Insulating materials such as epoxy bonding agents shall not be used unless otherwise called for in the design.
- B. If repair materials have a saturated bulk resistivity of 50,000 ohm-cm or greater, pack Galvashield® Embedding Mortar or another repair mortar with a resistivity of 15,000 ohm-cm or less between the anode and the substrate to provide an ionically conductive path to the substrate.

## **2.03 STORAGE**

Deliver, store, and handle all materials in accordance with manufacturer's instructions. Anode units shall be stored in dry conditions in the original unopened containers in a manner to avoid exposure to extremes of temperature and humidity.

## **PART 3 – EXECUTION**

### **3.01 EMBEDDED GALVANIC ANODES IN CONCRETE REPAIR**

- A. Concrete Removal
  1. Remove loose or delaminated concrete.
  2. Undercut all exposed reinforcing steel by removing concrete from the full circumference of the steel as per ICRI R310.1R. The minimum clearance between the concrete substrate and reinforcing steel shall be  $\frac{3}{4}$  inch (19 mm) or  $\frac{1}{4}$  inch larger than the top size aggregate in the repair material, whichever is greater.
  3. Concrete removal shall continue along the reinforcing steel until no further delamination, cracking, or significant rebar corrosion exists and the reinforcing steel is well bonded to the surrounding concrete as per ICRI R310.1R.
- B. Cleaning and Repair of Reinforcing Steel
  1. Clean exposed reinforcing steel of rust, mortar, etc. to provide sufficient electrical connection and mechanical bond.
  2. If significant reduction in the cross section of the reinforcing steel has occurred, replace or install supplemental reinforcement as directed by the engineer of record.
  3. Secure loose reinforcing steel by tying tightly to other bars with steel tie wire.
  4. Verify electrical continuity of all reinforcing steel, including supplemental steel, as per Section 3.01.D.6.

5. If the reinforcing steel is to receive a barrier coating, do not coat the reinforcing steel within 1 in. (25mm) of the anode and do not apply coating to any surface of the anode or the steel tie wires.
- C. Edge and Surface Conditioning of Concrete
1. Concrete patches shall be square or rectangular in shape with squared corners per ICRI Guideline 310.1R.
  2. Saw cut the patch boundary ½ inch deep or less if required to avoid cutting reinforcing steel.
  3. Create a clean, sound substrate by removing bond-inhibiting materials from the concrete substrate by high pressure water blasting or abrasive blasting.
- D. Galvanic Anode Installation
1. Install anode units and repair material immediately following preparation and cleaning of the steel reinforcement.
  2. Galvanic anodes shall be installed along the perimeter of the repair and along the interface between new and old concrete.
  3. Place the galvanic anodes as close as possible to the patch edge while still providing sufficient clearance between anodes and substrate to allow the repair material to fully encase the anode with a minimum concrete or mortar cover over the anode of 1 in. (25mm). If necessary, increase the size of the repair cavity to accommodate the anodes.
    - a. Place the anode such that it is attached to a single bar or at the intersection between two bars and secure to each clean bar.
    - b. If less than 1 in. (25 mm) of concrete cover is expected, place anode beneath the bar and secure to clean reinforcing steel.
  4. The tie wires shall be wrapped around the cleaned reinforcing steel at least one full turn in opposite directions and then twisted tight to create a secure electrical connection and allow no anode movement during concrete placement.
  5. If repair materials with resistivity greater than 15,000 ohm-cm are to be used or if the resistivity is unknown, pack Galvashield Embedding Mortar between the anode and the substrate concrete to create a conductive grout bridge ensuring no voids exist.
  6. Electrical Continuity
    - a. Confirm electrical connection between anode tie wire and reinforcing steel by measuring DC resistance (ohm  $\Omega$ ) or DC potential (mV) with a multi-meter.
    - b. Electrical connection is acceptable if the DC resistance measured with the multi-meter is 1  $\Omega$  or less or the DC potential is 1 mV or less.
    - c. Confirm electrical continuity of the exposed reinforcing steel within the repair area. If necessary, electrical continuity shall be established by tying discontinuous steel to continuous steel using steel tie wire.
    - d. Electrical continuity between test areas is acceptable if the DC resistance measured with multi-meter is 1  $\Omega$  or less or the potential is 1 mV or less.
- E. Concrete or Mortar Replacement
1. If the repair procedures require the concrete surface to be saturated with water, do not damage the anode nor allow the anode units to be soaked for greater than 20 minutes.
  2. Complete the repair with the repair material, taking care not to damage, loosen or leave voids around the anode.

**END OF SECTION**

## **PART I - GENERAL**

### **1.01 SECTION INCLUDES**

- A. For concrete partial depth patch repairs, overlays and new structural strengthening work to provide a sound surface profile preparation in conformance with the details indicated on the Drawings. This includes removal of all delaminated, sound and unsound concrete within the repair limit areas shown on the Drawings and the removal of unsound and weakened concrete surfaces and voids and the preparation of a sound cavity substrate to be filled over overlaid with cementitious repair materials.

### **1.02 RELATED SECTIONS**

- A. Section 02 41 00 – Demolition Work
- B. Section 31 40 00 – Shoring and Underpinning
- C. Section 03 20 00 - Concrete Reinforcement
- D. Section 03 30 00 - Cast-In-Place Concrete
- E. Section 03 01 30.71 - Concrete Rehabilitation.
- F. Section 03 64 23 – Epoxy Injection Concrete Crack Repair.

### **1.03 REFERENCES**

- A. American Concrete Institute
  - 1. ACI-301 - Specifications for Structural Concrete for Buildings.
  - 2. ACI 318 - Building Code Requirements for Structural Concrete.
  - 3. ACI 546R - Concrete Repair Guide
- B. International Concrete Repair Institute
  - 1. ICRI Guideline No. 310.1R-2008 - Guide for Surface Preparation for Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion.
  - 2. ICRI Guideline No. 320.1R-2019 - Guide for Selecting Application Methods for the Repair of Concrete Surfaces.
  - 3. ICRI Guideline No. 301.2R-2013 - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.
- C. Comply with the provisions of the above codes, specifications, and standards, except where more stringent requirements are shown on the drawings or specified herein.

## **PART 2 – PRODUCTS**

**Not Used**

### **PART 3 - EXECUTION**

#### **3.01 GENERAL**

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until satisfactory conditions are corrected and have been inspected by a third-party inspector retained by the Owner, the Engineer, or by the Owner's Project Representative.
- B. No concrete removal shall proceed within 60 lineal feet (min.) of new concrete placement areas until 72 hours of curing time has elapsed, unless otherwise approved by Engineer.

#### **3.02 LOCATION AND MARKING OF WORK AREA**

- A. Existing Concrete Surface (Partial Depth) Removal
  - 1. As shown on the drawings, layout and mark the concrete areas to be removed. Use chain dragging, hammer sounding, visual identification of slab lift off cracks and other methods to identify full areas of repair. Locations and areas shown on the Drawings are approximate; actual locations and layout shall be verified by the Engineer at the time the work is to be performed.
  - 2. The Engineer may define and mark additional unsound concrete areas for removal, if required.
  - 3. Areas to be removed shall be as straight and orthogonal as practical to encompass repair areas and to provide neat, straight overlay patch joints.

#### **3.03 CONCRETE REMOVAL AND CAVITY PREPARATION**

- A. Verify that shoring has been fully completed and secured to support those areas under repair prior to concrete removal.
- B. As designated on the drawings, concrete to be removed shall have its marked boundaries sawcut to a depth of 1/2 inch unless otherwise noted. All edges and overlay joints shall be straight. Do not overcut or leave sawcuts in the concrete to remain.
- C. All concrete shall be removed to the minimum depth limits shown on the drawings. The maximum size and chipping angle of pneumatic hammers used for concrete removal is as indicated on the drawings.
- D. Where embedded reinforcement is exposed by concrete removal, extra caution shall be exercised to avoid damaging it during removal of additional unsound concrete. If bond between exposed embedded reinforcement and adjacent concrete is impaired by the Contractor's removal operations the Contractor shall perform additional removal around and beyond the perimeter of the reinforcement along the entire affected length.
- E. If rust is present on embedded reinforcement where it enters sound concrete, then additional

removal of concrete along and beneath the reinforcement will be required. Such additional removal shall continue until non-rusted reinforcement is exposed or removal may be terminated as the Engineer directs.

- F. Following completion of concrete removal by pneumatic jack hammers and electric chipping tools to the limits and depth shown on the drawings the remaining concrete cavity surfaces shall be thoroughly water blasted (4,000 psi minimum) or sand blasted to remove concrete and aggregate loosened by chipping hammer removal.
- G. Concrete removal by conventional (jackhammer) removal methods may be performed by power chipping or hand tools except that pneumatic hammer heavier than 15 lb. class will not be permitted within 2" of final demolition or cavity limit of surfaces to be prepared for overlay. Such tools may be started in a vertical but must be immediately tilted to a maximum of 60-degree operation angle. Pneumatic hammers heavier than 15 lb. class will not be permitted for removals within 2" of demolition limit, or in areas directly above the top longitudinal reinforcing steel, or around primary girder reinforcing.
- H. At small spall areas and cracks where repair limit depths will be less than 1" deep, use needle scales, grinders and sawcuts as necessary to prepare a sound substrate, surface profile and detailed opening to receive and bond with repair material fill.

### **3.04 INSPECTION OF CAVITY SURFACES AND EXPOSED REINFORCING**

- A. After concrete removal is complete but prior to final cleaning, the cavity and exposed reinforcement shall be inspected by the Contractor and verified by the Engineer for sound undamaged concrete surfaces. Where the Engineer can detect unsatisfactory cavity preparation the Engineer may direct the Contractor to perform additional removals. The Engineer will verify that additional removals have been performed as directed.
- B. The Contractor shall inspect embedded reinforcement exposed within the cavity for defects due to corrosion or damage resulting from removal operations.
- C. Replacement of damaged or defective reinforcement shall be performed according to this Section and as directed by the Engineer.

### **3.05 REINFORCEMENT IN REPAIR AREA**

- A. All embedded reinforcement exposed during surface preparation that has lost more than 15% of the original cross-sectional area due to corrosion shall be considered defective. All non-defective exposed reinforcement that has lost section (to the extent specified above) as a direct result of Contractor's removal operations, shall be considered damaged.
- B. Supplement defective or damaged embedded reinforcement with a reinforcement of equal diameter having a Class "B" tension lap splices, minimum splice (ACI-318) beyond the damaged portion of the reinforcement. Secure the new reinforcement to the existing reinforcement with wire ties and/or approved anchors.

- C. Loose reinforcement exposed during surface preparation shall be securely anchored to the prepared substrate prior to patch placement. Loose reinforcement shall be adequately secured by wire ties to bonded reinforcement or shall have drilled-in anchors installed to the original deck. The Engineer shall determine the adequacy of wire ties and approve other anchoring devices prior to their use.
- D. Concrete shall be removed to provide a minimum of 3/4 inch clearance on all sides of exposed embedded reinforcement that is left in place unless otherwise noted on the drawings.

### **3.06 CLEANING OF EXPOSED REINFORCING**

- A. All exposed reinforcing steel shall be cleaned of all rust, oil, dirt, concrete fragments, laitance, scale and other coatings that inhibit bond by sandblasting, waterblasting, needle scalers or other acceptable methods.
- B. Cleaning of reinforcing steel shall be completed immediately before overlay placement to ensure that the base metal is not exposed to the elements and further rusting for extended periods of time.

### **3.07 PREPARATION OF EXPOSED SOUND CONCRETE FOR OVERLAY PLACEMENT**

- A. Concrete demolition limits and cavities will be examined prior to commencement of overlay or patching operations. Sounding the surface shall be part of the examination. Any delamination noted during the sounding shall be removed as specified in this Section.
- B. Cavities shall be waterblasted or sandblasted. Airblasting is required as a final step to remove all loose debris. All debris shall be removed from the site prior to the start of patching or placement of overlay.
- C. Concrete surfaces shall be cleaned to remove all existing membrane materials and all other substances detrimental to concrete bond. Shotblast followed by waterblast all surfaces to receive the new concrete overlay slab. Provide minimum 1/8" inch surface profile conforming to ICRI CSP5. Provide SSD conditions on substrate immediately prior to concrete placement.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.0.1 SECTION INCLUDES**

- A. Preparation of Concrete and Application of Repair Materials.
- B. Restoration of Concrete Surfaces.
- C. Repair of Unsound and Delaminated Concrete.

### **1.02 RELATED SECTIONS**

- A. Section 03 01 23 – Embedded Galvanic Anodes.
- B. Section 03 01 30 – Surface Preparation for Overlay
- C. Section 03 30 00 – Cast-In-Place Concrete.
- D. Section 03 64 23 – Epoxy Injected Concrete Crack Repair.
- E. Section 07 92 00 – Joint Sealants.
- F. Section 09 91 14 Exterior Concrete Coating.
- G. Section 09 91 15 – High Performance Exterior Concrete Coating.
- H. Section 31 40 00 – Shoring and Underpinning

### **1.03 REFERENCES**

- A. ASTM International.
  - 1. ASTM C-33 – Concrete Aggregates.
  - 2. ASTM C-150 - Portland Cement.
  - 3. ASTM C-39 - Compressive Strength.
  - 4. ASTM C-109 - Modified Compressive Strength.
  - 5. ASTM C-157 - Drying Shrinkage.
  - 6. ASTM C-387 - Packaged, Dry, Combined Materials for Mortar and Concrete.
  - 7. ASTM C-496 - Splitting Tensile Strength.
  - 8. ASTM C-666 - Freeze Thaw Resistance.
  - 9. ASTM C-881 - Epoxy-Resin-Base Bonding Systems for Concrete.
  - 10. ASTM C-882 - Modified Bond Strength.
  - 11. ASTM C-928 - Packaged, Dry, Rapid-Hardening, Cementitious Materials for Crack Repairs.
  - 12. ASTM C-469 - Elastic Modulus.
- B. American Concrete Institute.
  - 1. ACI 201.2R - Guide to Durable Concrete.
  - 2. ACI 223 - Standard Practice for the Use of Shrinkage-Compensating Concrete.
  - 3. ACI 308 - Standard Practice for Curing Concrete.

4. ACI 318 - Building Code Requirements for Structural Concrete.
  5. ACI 335.1R - State-of-the-Art Report on Anchorage to Concrete.
  6. ACI 503.4 - Standard Specifications for Repairing Concrete with Epoxy Mortars.
  7. ACI 504R - Guide to Sealing Joints in Concrete Structures.
  8. ACI 548R - Polymers in Concrete.
  9. ACI 548.1R - Guide for the Use of Polymers in Concrete.
  10. ACI 548.3R - State-of-the-Art Report on Polymer Modified Concrete.
  11. ACI 562 – Code Requirements for Evaluation Repair and Rehabilitation of Concrete Buildings.
- C. International Concrete Repair Institute.
1. ICRI Technical Guideline No. 310.2R-2013 – Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.
  2. ICRI Concrete Surface Profile chips – set or 10.
  3. ICRI Technical Guideline No. 210.3R-2013 – Guide for Using In-Situ Tensile Pull off Tests to Evaluate Bond of Concrete Surface Materials.
  4. ICRI Technical Guideline No. 320.2R-2009 – Guide for Selecting Materials for Repair of Concrete Surfaces.
  5. ICRI Technical Guideline No. 310.1R-2008 – Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion.
  6. ICRI Technical Guideline No. 310.3-2004 – Guide for the Preparation of Concrete Surfaces for Repair Using Hydrodemolition Methods.

#### **1.04 SUBMITTALS**

- A. Submit product data under provisions of Section 01 33 00 – Submittal Procedures.
- B. Submit substitutions under provisions of Section 01 60 00 – Product Requirements.
- C. Submit product data indicating product standards, physical and chemical characteristics, technical specifications, limitations, maintenance instructions, and general recommendations regarding each material.
- D. Identify the intended use of each product material submitted.

#### **1.05 PRODUCT RECORD DOCUMENTS**

- A. Submit documents under provisions of Section 01 70 00 – Execution Requirement and Closeout Requirements.
- B. Accurately record actual locations of structural concrete and reinforcement repairs, and type of repairs on Record Document Plans.

#### **1.06 QUALITY ASSURANCE**

- A. Materials Manufacturer: Company specializing in manufacturing the products specified in this Section with a minimum of ten (10) years of experience.

- B. Work people: Supervisor and lead technician with minimum of ten (10) years of specialized experience in concrete repair.
- C. Applicator: Company specializing in concrete repair with a minimum of eight (8) years documented experience, approved by materials manufacturer.

### **1.07 DELIVERY, STORAGE AND HANDLING**

- A. Deliver products to site under provisions of Section 01 60 00 – Product Requirements.
- B. Store and protect products under provisions of Section 01 60 00 – Product Requirements.
- C. Comply with instructions for storage, shelf-life limitations, and handling.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURER**

- A. Cementitious Concrete Repair Materials.
  - 1. BASF, Products: Master Emaco T415, T430.
  - 2. Sika, Products: Sika Repair 222, Sika Repair 223 and Sika Repair SHB.
  - 3. Mapei: Planitop 15, Planitop 18, Planitop X.
  - 4. Substitutions in accordance with Section 01 60 00 – Products Requirements.
- B. Ready Mix Concrete – See Section 03 30 00 – Cast-In-Place Concrete.
- C. Concrete Repair Mortars, concrete and bonding agents shall be Portland Cement based materials with suitable electrical conductivity of less than 15,000 ohm-cm. Non-conductive repair materials such as epoxy, urethane, latex polymers, or magnesium phosphate shall not be permitted.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that surfaces are ready to receive work.
- B. Surfaces shall be sound concrete which exhibits a minimum of 125 psi pullout strength when tested in accordance with Appendix A of ACI 503 - Use of Epoxy Compounds with Concrete.
- D. Surfaces shall be free of any deleterious materials such as the residues, laitance, dust, dirt, and oil.
- E. Beginning of installation means installer accepts existing substrate.

### **3.02 PREPARATION**

- A. Clean concrete surfaces of dirt, laitance, corrosion, or other contamination; wire brush using water.
- B. Flush out cracks and voids with air and/or water blasting to remove laitance and dirt.
- C. See Specification Section 03 01 30 – Surface Preparation for Overlay for demolition and surface preparation requirements.
- D. Refer to manufacturer’s product data sheets for SSD or dry surface condition requirements at the time of concrete rehabilitation material placement on substrate.
- E. Wire brush, sand blast or needle scaler clean the exposed reinforcement steel surfaces to remove all laitance and expose white metal. Notify Engineer of any damaged portions of reinforcing steel for review prior to patching.

### **3.03 REHABILITATION WORK**

- A. Place rehabilitation concrete as indicated on the Drawings.
- B. Ensure surfaces to receive rehabilitation have been prepared in strict accordance with Section 03 01 30 - Surface Preparation for Overlay.
- C. Prepare repair of spall and delaminated areas as indicated on the Drawings and specifications. Fill voids flush with adjacent surface.

### **3.04 APPLICATION**

- A. Apply mortar, grouts and concrete materials in strict accordance with Manufacturer’s instructions.
- B. At the time of application, the substrate shall be saturated surface dry (SSD) with no standing water, unless otherwise noted by the Product Manufacturer’s instructions.
- C. Hand applied mortar and/or concrete shall be scrubbed into substrate filling all pour and voids. Fill repair areas in accordance with Manufacturer’s directions for the repair material specified.
- D. Damp cure cementitious mortar, grout and concrete for four (4) days.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.01 SECTION INCLUDES**

- A. Cleaning and preparing concrete surfaces for application of cold liquid applied treatments by mechanical shotblast, hydrodemolition, diamond planning or cold planner with shot flaps. Hydroblasting, shotblast, and equivalent methods are preferred.

### **1.02 RELATED SECTIONS**

- A. Section 03 01 30 - Concrete Rehabilitation.
- B. Section 03 30 00 - Cast-in-Place Concrete.
- C. Section 03 90 10 – Corrosion Inhibitor Treatment.
- D. Section 07 92 00 – Joint Sealants.

### **1.03 REFERENCES**

- A. ASTM International.
  - 1. ASTM C 811 - Standard Practice for Surface Preparation of Concrete for Application of Chemical-Resistant Resin Monolithic Surfacing.
  - 2. ASTM D4258 - Practice for Surface Cleaning Concrete for Coating.
  - 3. ASTM D 4259 - Practice for Abrading Concrete.
  - 4. ASTM D 4262 - Test Method for pH of Chemically Cleaned or Etched Concrete Surface.
  - 5. ASTM D 4285 - Test Method for Indicating Oil or Water in Compressed Air.
  - 6. ASTM D 4260 - Practice for Acid Etching Concrete.
  - 7. ASTM D 4263 - Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
- B. American Concrete Institute.
  - 1. ACI 515.1R - A Guide to the Use of Waterproofing, Damp proofing, Protective and Decorative Barrier Systems for Concrete, 3.4 Surface Preparation.
  - 2. ACI 546.1R - Concrete Repair Guide.
  - 3. ACI 201.R - Guide for Durable Concrete.
- C. International Concrete Repair Institute
  - 1. ICRI Guideline 320-IR-2013 – Selecting and Specifying Concrete Surface preparation for sealers, coatings and polymer overlays.
  - 2. ICRI Guideline 310 2R Bundle-Concrete Surface Profile Chips, set of 10.

### **1.04 DEFINITIONS**

- A. Clean: No foreign matter such as dust, dirt, loose surface material, grease, oil, oil-based substances or other contaminants.
- B. Dry: No free water present and no moisture vapor (ASTM D 4263).

- C. Free of Laitance: Remove high water-cement ratio gel that comes to surface in a concrete pour. This gel has very poor integrity and adhesion to the parent concrete.
- D. Surface Defects: Fins, ridges, projections, concrete droppings and variations in surface finish tolerance greater than 3/16 inch in 25 feet that may adversely affect coating application performance.
- E. Deteriorated areas: Section 03 01 30 – Surface Preparation for Overlay.
- F. Strength below surface of concrete: Ability of concrete to resist fractures due to stresses exerted on it by coating system. Because many coating systems and most protective barriers exert stresses on the concrete from shrinkage during curing or cooling after application, and when they undergo ambient temperature changes in service, the concrete itself must have strength to resist these stresses without failing.
- G. Structural Concrete: Reinforced, 4000 psi minimum.

#### **1.05 QUALITY ASSURANCE**

- A. Mockup: Provide mockup of typical preparation surface under provisions of Section 01 40 00 – Quality Requirements.
- B. Provide an area 20 feet long by 26 feet wide illustrating preparation surface.
- C. Locate in an area where directed and where it can remain as a reference throughout the project.
- D. Coat 1/2 of preparation surface according to Section 07 18 16.1 – Elastomeric Traffic Deck Coating to verify acceptable adhesion.
- E. Mockup may become part of the work at the completion of the project upon acceptance of the completed work.

### **PART 2 - PRODUCTS**

#### **2.01 EQUIPMENT AND MATERIALS**

- A. Shotblast: Self-contained steel shotblasting unit.
  - 1. Constant self-propelled speed capability.
  - 2. 98% minimum steel shot recovery and containment.
  - 3. Vacuum features to retain dust, dirt and debris from shotblasting, leaving concrete pores open.
  - 4. Steel shot propelled by airless centrifugal center fed blast wheels rotating perpendicular to direction of travel.
  - 5. Blasts to 1/4 inch from walls, columns or other verticals.
  - 6. Abrasive aggregate: ASTM 136.
- B. High pressure water blast system (Hydrodemolition).
  - 1. Rotary head machine capable of providing 9,000 psi minimum.

## **2.02 ACCESSORIES**

- A. Abrasive aggregate: ASTM C 136.
- B. Stiff bristle brooms.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify substrate is structural concrete and adequate strength below surface exists to accommodate work in Division 07 00 00.
- B. Verify “downtime” of area to be cleaned and submit to Owner.
- C. Verify surface temperature at application time for cleaning chemicals and removal are within limits of method specified.
- D. Verify surface conditions and required cleaning, profiling and removal are within limits of method specified.

### **3.02 PREPARATION**

- A. Protect adjacent surfaces with drop cloths and tape to control dust, overspray damage and erosion chemical staining or etching of surrounding surfaces.
- B. Protection must be in place before application begins.

### **3.03 APPLICATION**

- A. ACI 515.1R - Surface Preparation.
- B. Clean surfaces to receive coating in accordance with Manufacturer’s instructions for Section 07 18 16.1 – Elastomeric Traffic Deck Coating System.
- C. Provide clean, dry surface, free of laitance and deteriorated areas.
- D. Remove surface defects by mechanical grinding or impact method.
- E. Clean corners, around columns, near drains and other areas not able to be reached by specified method with mechanical grinder, stiff wire brush, or other hand held portable mechanical means capable of producing surface profile similar to specified surface conditions.
- F. Remove gum and other materials adhered to concrete surface.
- G. Prevent debris from being incorporated into material being applied by the specified method.
- H. Remove excess or rejected material from site promptly and properly to avoid damage, marring or staining existing surfaces.

### **3.04 APPLICATION - SHOTBLAST**

- A. ASTM C 136, ASTM D 4259, and ASTM D 4285.
- B. Uniformly clean dry surface and profile.
- C. Leave concrete pores open to allow maximum adhesion/penetration of the concrete protection system.
- D. Remove 1/16 inch to 1/8 inch.
- E. See 1.02 – Related Sections and Drawings for ICRI minimum concrete surface profile requirements for each coating system.
- F. Magnetic sweep and then low pressure air blast surface to remove residual steel shot.

### **3.05 APPLICATION - AIR BLAST**

- A. ASTM D 4258 and ASTM D 4285.
- B. Blast surface, cracks, and areas not reached by other methods with air.
- C. Remove debris and dirt from site and dispose of in accordance with local regulations.

### **3.06 FIELD QUALITY CONTROL**

- A. ACI 515.1R - Tests for Surface Quality Prior to Application.
- B. Inspect the surface for uniformity. Protrusions must be less than 1/16 inch and holes less than 1/8 inch in diameter.
- C. Surface must be clean with no white powder appearing on a dark cloth wiped across the surface.
- D. Conduct water droplet test to determine oily condition. Droplets should spread out on the surface immediately. Droplets that bead up indicate oil or other agents present that will adversely affect coating adhesion.
- E. Determine surface dryness ASTM D 4263.
- F. Determine presence of laitance. No fine powder formed when knife scraped across surface.
- G. Tensile strength test of concrete surface. See coating system manufacturer requirements - 200 psi minimum.
- H. Perform adhesion test on coating applied to patch of prepared surface.

### **3.07 CLEANING**

- A. Clean residue and debris promptly. Remove from site and dispose properly in accordance with local regulations.
- B. Clean site without damaging other surfaces.
- C. Leave surfaces treated as part of the Work of this Section and other surfaces uncontaminated clean and dry.

**3.08 PROTECTION**

- A. Protect cleaned surfaces from dirt, debris, dust, water and other contamination that will affect coating operation and overlays.

**END OF SECTION**

## **PART 1 – GENERAL**

### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Formwork for cast-in place concrete.
  - 2. Shoring, bracing, and anchorage.
  - 3. Architectural form liners.
  - 4. Form accessories.
  - 5. Form stripping.
  
- B. Related Sections:
  - 1. Section 03 15 13 - PVC Waterstops.
  - 2. Section 03 20 00 - Concrete Reinforcing.
  - 3. Section 03 30 00 - Cast-In-Place Concrete.
  - 4. Section 05 50 00 - Metal Fabrications: Product requirements for metal fabrications for placement by this Section.

### **1.02 REFERENCES**

- A. American Concrete Institute:
  - 1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
  - 2. ACI 301 - Specifications for Structural Concrete.
  - 3. ACI 318 - Building Code Requirements for Structural Concrete.
  - 4. ACI 347 - Guide to Formwork for Concrete.
  
- B. American Forest and Paper Association:
  - 1. AF&PA - National Design Specifications for Wood Construction.
  
- C. The Engineered Wood Association:
  - 1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood.
  
- D. ASTM International:
  - 1. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
  - 2. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
  
- E. West Coast Lumber Inspection Bureau:
  - 1. WCLIB - Standard Grading Rules for West Coast Lumber.

### **1.03 DESIGN REQUIREMENTS**

- A. Design, engineer and construct formwork, shoring and bracing in accordance with ACI 318 to conform to design and applicable code requirements to achieve concrete shape, line and dimension as indicated on Drawings.

#### **1.04 PERFORMANCE REQUIREMENTS**

- A. Vapor Retarder Permeance: Maximum 1 perm when tested in accordance with ASTM E96, Procedure A.

#### **1.05 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings:
  - 1. Submit formwork, shoring, and reshoring shop drawings.
  - 2. Indicate the following:
    - a. Pertinent dimensions, openings, methods of construction, types of connections, materials, joint arrangement and details, ties and shores, location of framing, studding and bracing, and temporary supports.
    - b. Means of leakage prevention for concrete exposed to view in finished construction.
    - c. Sequence and timing of erection and stripping assumed compressive strength at time of stripping, height of lift and height of drop during placement.
    - d. Vertical, horizontal and special loads in accordance with ACI 347, Section 2.2 and camber diagrams, when applicable.
    - e. Notes to formwork erector showing size and location of conduits and piping embedded in concrete in accordance with ACI 318, Section 6.3.
    - f. Procedure and schedule for removal of shores and installation and removal of reshores.
- C. Product Data: Submit data on void form materials and installation requirements.

#### **1.06 QUALITY ASSURANCE**

- D. Perform Work in accordance with ACI 301.
- E. For wood products furnished for work of this Section, comply with AF&PA.

#### **1.07 QUALIFICATIONS**

- A. Design formwork under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Washington.

#### **1.08 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate this Section with other sections of work, requiring attachment of components to formwork.

### **PART 2 – PRODUCTS**

#### **2.01 WOOD FORM MATERIALS**

- A. Form Materials: At discretion of Contractor.

- B. Plywood: Douglas Fir species; medium density overlaid one side grade; sound undamaged sheets with clean, true edges.
- C. Plywood Forms:
  - 1. Application: Use for exposed finish concrete.
  - 2. Forms: Conform to PS 1; full size 4 x 8 feet panels; each panel labeled with grade trademark of APA/EWA.
  - 3. Plywood where “Smooth Finish” is required, as indicated on Drawings: APA/EWA “HD Overlay Plyform Structural I Exterior” grade, minimum of 3/4 inch (19 mm) thick.

## **2.02 FORMWORK ACCESSORIES**

- A. Form Ties: Snap-off type, galvanized metal, fixed length, cone type, with waterproofing washer, back break dimension of 1 1/4" inch, free of defects capable of leaving holes larger than 1 inch in concrete surface.
- B. Spreaders: Standard, non-corrosive metal form clamp assembly, of type acting as spreaders and leaving no metal within 1 inch (25 mm) of concrete face. Wire ties, wood spreaders or through bolts are not permitted.
- C. Form Anchors and Hangers:
  - 1. Do not use anchors and hangers at exposed concrete that leave exposed metal within 1-inch of concrete surface.
  - 2. Symmetrically arrange hangers supporting forms from structural steel members to minimize twisting or rotation of member.
  - 3. Penetration of structural steel members is not permitted.
- D. Form Release Agent: Colorless mineral oil that will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
  - 1. Manufacturers:
    - a. Arcal Chemical Corporation Arcal-80.
    - b. Industrial Synthetics Company Synthex.
    - c. Nox-Crete Company Nox-Crete Form Coating.
- E. Corners: Chamfer, wood strip type; 3/4 x 3/4 inch size; maximum possible lengths.
- F. Vapor Retarder: Where indicated on Drawings, 8 mil (0.2 mm) thick polyethylene sheet.
- G. Bituminous Joint Filler: ASTM D1751.
- H. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size, strength and character to maintain formwork in place while placing concrete.

## **PART 3 – EXECUTION**

### **3.01 EXAMINATION**

- 1. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

2. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions agree with Drawings.
3. When formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Architect/Engineer.

### **3.02 INSTALLATION**

#### **A. Earth Forms:**

1. Earth forms are permitted for concrete under pool deck linear drains.
  - a. Trench earth forms neatly, accurately, and at least 2 inches (50 mm) wider than grade beam and footing widths indicated on Drawings.
  - b. Trim sides and bottom of earth forms.
  - c. Construct wood edge strips at top of each side of trench to secure reinforcing and prevent trench from sloughing.
  - d. Form sides of footings where earth sloughs.
  - e. Tamp earth forms firm and clean forms of debris and loose material before depositing concrete.

#### **B. Formwork - General:**

1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.
2. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations.
3. Camber forms where necessary to produce level finished soffits unless otherwise shown on Drawings.
4. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete.
5. Complete wedging and bracing before placing concrete.

#### **C. Forms for Smooth Finish Concrete:**

1. Use steel, plywood or lined board forms.
2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.
3. Use full size sheets of form lines and plywood wherever possible.
4. Tape joints to prevent protrusions in concrete.
5. Use care in forming and stripping wood forms to protect corners and edges.
6. Level and continue horizontal joints.
7. Keep wood forms wet until stripped.

#### **D. Framing, Studding and Bracing:**

1. Space studs at 16 inches (400 mm) on center maximum for boards and 12 inches (300 mm) on center maximum for plywood.
2. Size framing, bracing, centering, and supporting members with sufficient strength to maintain shape and position under imposed loads from construction operations.
3. Construct beam soffits of material minimum of 2 inches (50 mm) thick.
4. Distribute bracing loads over base area on which bracing is erected.

- 5. When placed on ground, protect against undermining, settlement or accidental impact.
- E. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- F. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- G. Obtain Architect/Engineer's approval before framing openings in structural members not indicated on Drawings.
- H. Install chamfer strips on external corners of beams, joists, columns and walls.
- I. Do not reuse wood formwork more than 6 times for concrete surfaces to be exposed to view. Do not patch formwork.

### **3.03 APPLICATION - FORM RELEASE AGENT**

- A. Verify that forms are clean and free of rust before applying release agent.
- B. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- C. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- D. Do not apply form release agent where concrete surfaces are indicated to receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.
- E. Reuse and Coating of Forms: Thoroughly clean forms and reapply form coating before each reuse. For exposed work, do not reuse forms with damaged faces or edges. Apply form coating to forms in accordance with manufacturer's specifications. Do not coat forms for concrete indicated to receive "scored finish". Apply form coatings before placing reinforcing steel.

### **3.04 INSTALLATION - INSERTS, EMBEDDED PARTS, AND OPENINGS**

- A. Install formed openings for items to be embedded in or passing through concrete work.
- B. Locate and set in place items required to be cast directly into concrete.
- C. Coordinate with Work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Install accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Install water stops continuous without displacing reinforcement. Heat seal joints watertight.
- F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

- G. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.
- H. Form Ties:
  - 1. Use sufficient strength and sufficient quantity to prevent spreading of forms.
  - 2. Place ties at least 1 inch (25 mm) away from finished surface of concrete.
  - 3. Leave inner rods in concrete when forms are stripped.
  - 4. Space form ties equidistant, symmetrical and aligned vertically and horizontally unless otherwise shown on Drawings.
- I. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.
- J. Construction Joints:
  - 1. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints.
  - 2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.
  - 3. Show no overlapping of construction joints. Construct joints to present same appearance as butted plywood joints.
  - 4. Arrange joints in continuous line straight, true and sharp.
- K. Embedded Items:
  - 1. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, water stops, and other features.
  - 2. Do not embed wood or uncoated aluminum in concrete.
  - 3. Obtain installation and setting information for embedded items furnished under other Specification sections.
  - 4. Securely anchor embedded items in correct location and alignment prior to placing concrete.
  - 5. Verify conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 for size and location limitations.
- L. Openings for Items Passing Through Concrete:
  - 1. Frame openings in concrete where indicated on Drawings. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections.
  - 2. Coordinate work to avoid cutting and patching of concrete after placement.
  - 3. Perform cutting and repairing of concrete required as result of failure to provide required openings.
- M. Screeds:
  - 1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs.
  - 2. Slope slabs to drain where required or as shown on Drawings.
  - 3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water.
- N. Screenshot Supports:

1. For concrete over waterproof membranes and vapor retarder membranes, use cradle, pad or base type screed supports which will not puncture membrane.
  2. Staking through membrane is not be permitted.
- O. Cleanouts and Access Panels:
1. Provide removable cleanout sections or access panels at bottoms of forms to permit inspection and effective cleaning of loose dirt, debris and waste material.
  2. Clean forms and surfaces against which concrete is to be placed. Remove chips, saw dust and other debris. Thoroughly blow out forms with compressed air just before concrete is placed.

### **3.05 FORM CLEANING**

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

### **3.06 FORM REMOVAL**

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads and removal has been approved by Architect/Engineer.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.
- D. Leave forms in place for minimum number of days as specified in ACI 347.

### **3.07 ERECTION TOLERANCES**

- A. Tolerances: Construct formwork to produce completed concrete surfaces within construction tolerances specified in ACI 117.

### **3.08 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements, 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- C. Notify Owner's Project Representative and Architect/Engineer after placement of reinforcing steel in forms, but prior to placing concrete.
- D. Schedule concrete placement to permit formwork inspection before placing concrete.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.01 SECTION INCLUDES**

- A. These adhesive anchors are to be used for reinforcing steel dowels for concrete repair and strengthening with concrete reinforcement anchored in beams, slabs, walls and columns.

### **1.02 RELATED WORK**

- A. Section 03 20 00 – Concrete Reinforcement.
- B. Section 03 30 00 – Cast in Place Concrete
- C. Section 03 01 30.71 – Concrete Rehabilitation
- D. Section 05 50 00 – Miscellaneous Fabrication.

### **1.03 REFERENCES**

- A. ASTM A36 - Structural Steel
- B. ASTM A307 - Bolts, Nuts and Washers
- C. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
- D. ASTM A706 - Low-Alloy Steel Deformed Bars for Concrete Reinforcement
- E. ASTM E1512 - Standard Test for Testing Bond Performance of Adhesive Anchors
- F. ICBO ICC– ESR-3187.3814

### **1.04 SUBMITTALS**

- A. Shop Drawings and Product data: Submit shop drawings and product data sheets for the approval of the Engineer as per Section 01 33 00 - Submittal Procedures.

### **1.05 QUALITY ASSURANCE**

- A. Perform work in accordance with manufacturer's instructions.

### **1.06 PRODUCT DATA**

- A. Submit product data under provisions of Section 01 33 00 - Submittal Procedures.
- B. Provide product data for specified products.

- C. Submit manufacturer's instructions under provisions of Section 01 60 00 – Product Requirements.
- D. Submit Evaluation Report from International Conference of Building Officials (ICBO).
- E. ICBO Evaluation Report submitted shall be for wind and seismic in cracked and un-cracked concrete conditions.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS**

- A. HILTI HIT- HY 200 V3 Adhesive Anchoring System as manufactured by HILTI, P. O. Box 21148, Tulsa, Oklahoma 74121; Tel: #1-800-879-8000
- B. Submit documents for substitution as per Section 01 60 00 – Product Requirements.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Adhesive Epoxy Anchoring System will be used for installation of all reinforcing steel dowels or threaded anchor rods or inserts into existing concrete. Adhesives will be used only as per manufacturer's instructions. Injection adhesive will be formulated to include resin, hardener, cement and water to provide optimal curing speed as well as high strength and stiffness. Maximum curing time will be as per manufacturer's instructions.

### **3.02 INSPECTION**

- A. Adhesive Anchor Installation.
- B. All special inspections shall be according to ICBO ES, Evaluation Report for specified product.
- C. All tests to be carried out according to ASTM E1512, Standard Test for Testing Bond Performance of Adhesive Anchors.

### **3.03 STORAGE OF MATERIALS**

- A. All materials to be mixed by Contractor shall be stored in a clean, dry place, free of contaminating substances.

**END OF SECTION**

## **PART 1 – GENERAL**

### **1.01 SECTION INCLUDES**

- A. Provision of waterstops embedded in concrete and spanning control, expansion and/or construction joints thus creating a continuous diaphragm, thus preventing fluid migration.
- B. Hydrophilic waterstops for use in concrete joints subject to water, chlorinated water, seawater and many waterborne chemicals.

### **1.02 RELATED SECTIONS**

- A. Section 03 01 30.71 – Concrete Rehabilitation.
- B. Section 03 10 00 – Concrete Forming and Accessories.

### **1.03 REFERENCE**

- A. HYDROPHILIC WATERSTOP
  1. COE CRD-C 513 - Handbook for Concrete and Cement Corps of Engineers Specifications for Rubber Waterstops; 1974.
  2. American Society of Testing Materials (ASTM)
  3. Bureau of Reclamation: C-902
  4. Canadian General Standards Board: 41-GP-35M Type 1 & 3
  5. Section 03 10 00-Concrete Forms and Accessories
  6. Section 03 30 00-Cast In Place Concrete

### **1.04 QUALITY ASSURANCE**

- A. Waterstop manufacturer demonstrates five years (minimum) continuous, successful experience in production of hydrophilic waterstops.

### **1.05 SUBMITTALS**

- A. Comply with Section 01 33 10 – Submittals.
- B. Submit manufacturer product data with physical properties and instructions for installation.
- C. Submit manufacturer 6-inch sample of hydrophilic waterstop.
- D. Submit certification from manufacturer that materials comply with specifications.
- E. Submit warranty from manufacturer

### **1.06 DELIVERY, STORAGE AND HANDLING**

- A. Store waterstops in storage containers or under tarps to protect from oil, dirt, and sunlight/ultraviolet exposure.

## **PART 2 – PRODUCTS**

### **2.01 MANUFACTURER**

- A. Hydrophilic: Hydrotite CJ-1020-2K-ADH; [www.sikausa.com](http://www.sikausa.com); or equal.
- B. Sealant: Leakmaster, LV-1, by Sika, or equal

## **PART 3 – EXECUTION**

### **3.01 INSTALLATION**

- A. Clean surface of concrete below waterstops. Install as indicated below and according to manufacturer's instructions. Provide both the hydrophilic waterstop and the continuous compatible sealant for setting hydrophilic waterstops at all construction joints and at all locations where a waterstop is shown on the Drawings.
- B. Locate hydrophilic waterstops and sealant with minimum clear cover recommended by the manufacturer and as shown on the Drawings, whichever is greater.
- C. Apply manufacturer's recommended adhesive to dry and clean concrete location.
- D. Press waterstop continuously into adhesive and sealant. Avoid butt joints where possible but follow manufacturers' recommendations if they are necessary.
- E. Cut coil ends square (or at proper angle for mitered corners) with shears or sharp blade to fit splices together without overlaps. At any joint, apply adhesive to both ends of waterstop and press together to form tight joint.
- F. Allow to cure fully as per manufacturer's recommendations before placing concrete.
- G. Apply Leakmaster LV-1, by Greenstreak, according to manufacturer's instructions, continuously below the waterside at all hydrophilic type waterstops.

### **3.02 PREPARATION**

- A. Position waterstop to ensure proper distance from steel reinforcing bars and edges.
- C. Clean concrete joint after first pour to remove dirt and debris.
- D. Protect waterstop from damage during progress of work.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.01 SECTION INCLUDES**

- A. Summary.
  - 1. Reinforcing steel bars, welded steel wire fabric for cast-in-place concrete.
  - 2. Support chairs, bar supports, and spacers for supporting reinforcement.
  - 3. Concrete Accessories.

### **1.02 RELATED SECTIONS**

- A. Section 03 01 23 – Embedded Galvanic Anodes.
- B. Section 03 01 30 – Surface Preparation for Overlay.
- C. Section 03 15 00.01 – Concrete Accessories: Adhesive Anchors.
- D. Section 03 30 00 - Cast-In-Place Concrete.

### **1.03 REFERENCES**

- A. American Concrete Institute.
  - 1. ACI 301 - Specifications for Structural Concrete.
  - 2. ACI SP-66 - American Concrete Institute - Detailing Manual.
  - 3. ACI 318 - Building Code Requirements for Structural Concrete.
- B. ASTM International.
  - 1. ASTM A82 - Standard Specification for Cold Drawn Steel Wire for Concrete Reinforcement.
  - 2. ASTM A184/A184M – Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
  - 3. ASTM A497 – Standard Specification for Steel Welded Wire Fabric, Deformed for Concrete Reinforcement.
  - 4. ASTM A615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  - 5. ASTM A706M – Standard Specification for Low Alloy Steel Deformed Bars for Concrete.
  - 6. ASTM A955/A955M – Standard Specification for Deformed and Plain Stainless Steel Bars for Concrete Reinforcement.
- C. Concrete Reinforcing Steel Institute.
  - 1. CRSI - Manual of Standard Practice.
  - 2. CRSI – Placing Reinforcing Bars.
- D. American Welding Society.
  - 1. AWS D1.4 – Structural Welding Code – Reinforcing Steel.
  - 2. AWS D1.6 – Structural Welding Code – Stainless Steel.

### **1.04 SUBMITTALS**

- A. Section 01 33 00 – Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate bar sizes, spacing, locations, and quantities of reinforcing steel and welded wire fabric, bending and cutting schedules, and supporting and spacing devices.
- C. Certificates: Submit AWS qualification certificate for welders employed on the Work.
- D. Manufacturer’s Certificate: Certify Products meet or exceed specified requirements.
  - 1. Submit certified copies of mill test report of reinforcement materials analysis.

#### **1.05 QUALITY ASSURANCE**

- A. Perform concrete reinforcement work in accordance with CRSI - Manual of Standard Practice.
- B. Prepare Shop Drawings in accordance with ACISP-66.
- C. Conform to ACI 301.
- D. Installer Qualifications: Setting of all items shall be done by workers with experience in the trade.
- E. Certification: All welding shall be done by State of Washington Certified Welders.

#### **1.06 QUALIFICATIONS**

- A. Welders: AWS qualified within the previous 12 months.

#### **1.07 INSPECTION AND TESTING**

- A. Inspection and Testing will be performed in accordance with the provisions of Section 01 40 00 – Quality Requirements.
- B. The testing laboratory shall perform any or all of the following duties:
  - 1. Verify certification of welders.
  - 2. Verify size and accurate location of reinforcing.
  - 3. Inspect reinforcing bar welds.
  - 4. Perform tensile tests of sample welds of largest size bar for each type of welding.
  - 5. Verify the condition of surfaces for bond integrity with concrete, locations and sizes of all items to be embedded, and anchorage for prevention of displacement.
  - 6. Receive and review certificates for tests of reinforcing steel for compliance with specifications.
- C. Deficient welds will require Contractor to provide and pay for additional X-rays and tests as directed by the Engineer. Repair or replace defective welds to the satisfaction of the Engineer.

#### **1.08 SHOP DRAWINGS**

- A. Submit shop drawings under provisions of Section 01 30 00 – Administrative Requirements.

- B. Indicate sizes, spacing, locations and quantities of reinforcing steel, wire fabric, bending and cutting schedules, splicing, stirrup spacing, supporting and spacing devices.

#### **1.09 CERTIFICATES**

- A. Submit mill test certificates of supplied concrete reinforcing indicating physical and chemical analysis.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. Reinforcing Steel: ASTM A615, 60 ksi yield grade billet-steel deformed bars, uncoated and epoxy coated finish for slab top steel and ASTM 706, Grade 60 for welded reinforcing steel. Ultimate tensile stress shall not be less than 1.25 tensile yield stress nor shall actual yield strength exceed specified yield strength by more than 1800 psi.
- B. Welded Steel Wire Fabric: ASTM A185 plain type; in flat sheets; uncoated finish.

#### **2.02 ACCESSORY MATERIALS**

- A. Tie Wire: Minimum 16-gage annealed type. Use coated wire ties only for all epoxy coated reinforcing steel.
- B. Chairs, Bolsters, Bar Supports, and Spacers: Sized and Shaped for Strength and Support of reinforcement during concrete placement conditions.
- C. Chairs, Bolsters, Bar Supports, and Spacers Adjacent to Weather Exposed Concrete Surfaces and within the Natatorium: Plastic tipped type; sized and shaped as required.
- D. Barlock (MBT) Coupler Splice.

#### **2.03 FABRICATION**

- A. Fabricate in accordance with CRSI Manual of Practice.
- B. Form standard hooks for 180 and 90 degrees bends, stirrup and tie hooks and seismic hooks as indicated on Drawings.
- C. Form reinforcement bends with minimum diameters in accordance with ACI 318.
- D. Locate reinforcing splices not indicated on drawings at points of minimum stress. Indicate location of splices on shop drawings.
- E. Weld reinforcing bars in accordance with AWS DI.4.

### **PART 3 - EXECUTION**

**3.01 PLACEMENT**

- A. Before placing concrete, clean reinforcement of loose rust, mill scale, foreign particles and undesirable coatings, and accurately position, support, and secure in place to achieve not less than the minimum concrete coverage required for protection.
- B. Place, support, and secure reinforcement against displacement. Do not deviate from alignment or design measurements.
- C. Do not weld crossing reinforcement bars for assembly.
- D. Verify that anchors, seats, plates, waterstops, reinforcement and other items to be cast into the concrete are accurately placed, positioned securely, and will not interfere with concrete placement.
- E. Accommodate placement of formed openings.

**3.02 ERECTION TOLERANCES**

- A. Section 01 40 00 – Quality Requirements: Tolerances.
- B. Install reinforcement within the following tolerances for flexural members, wall, and compression members:

Reinforcement Depth	Depth Tolerances	Concrete Cover Tolerances
Greater than 8 inches	Plus or minus 3/8 inch	Minus 3/8 inch
Less than 8 inches	Plus or minus 1/2 inch	Minus 1/2 inch

**3.03 FIELD QUALITY CONTROL**

- A. Section 01 40 00 – Quality Requirements: Field inspection, testing, adjusting, and balancing.
- B. Field inspection and testing will be performed by Owner’s testing laboratory in accordance with ACI 318.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.01 SECTION INCLUDES**

- A. Cast-in-place concrete for new pool deck slabs, elevated concrete slabs, exterior paving, concrete restoration and repair.

### **1.02 RELATED WORK**

- A. Section 03 01 23 – Embedded Galvanic Anodes.
- B. Section 03 01 30.71 – Concrete Rehabilitation.
- C. Section 03 10 00 – Concrete Forming and Accessories.
- D. Section 03 15 13 – PVC Waterstops
- E. Section 03 20 00 – Concrete Reinforcement.
- F. Section 03 35 00 – Concrete Finishing.
- G. Section 03 90 10 – Corrosion Inhibitor Treatment.
- H. Section 31 40 00 – Shoring and Underpinning.
- I. Section 07 92 00 – Joint Sealants.

### **1.03 REFERENCES**

- A. A. American Concrete Institute.
  - 1. ACI 211.1 - Selecting Proportions for Normal-Density and High Density Concrete.
  - 2. ACI 301 - Specifications for Concrete Construction.
  - 3. ACI 302.1 - Guide for Concrete Floor and Slab Construction.
  - 4. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
  - 5. ACI 305.1 – Specification for Hot Weather Concreting.
  - 6. ACI 306.1 – Standard Specification for Cold Weather Concreting.
  - 7. ACI 308 - Standard Practice for Curing Concrete.
  - 8. ACI 318 - Building Code Requirements for Reinforced Concrete.
  - 9. ACI 347 - Recommended Practice for Concrete Formwork.
- B. ASTM International.
  - 1. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
  - 2. ASTM C33 - Standard Specification for Concrete Aggregates.
  - 3. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
  - 4. ASTM C42/C42M - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

5. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
6. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
7. ASTM C150 - Standard Specification for Portland Cement.
8. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
9. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
10. ASTM C157 - Standard Specification for Length Change of Hardened Hydraulic – Cement Mortar Concrete.
11. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
12. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
13. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
14. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
15. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
16. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
17. ASTM C685/C685M - Standard Specification for Concrete Made By Volumetric Batching and Continuous Mixing.
18. ASTM C845 - Standard Specification for Expansive Hydraulic Cement.
19. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
20. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
21. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
22. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
23. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
24. ASTM C1157 - Standard Performance Specification for Hydraulic Cement.
25. ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
26. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
27. ASTM C1602 - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
28. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
29. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

#### **1.04 SUBMITTALS**

- A. Section 01 30 00 – Submittal Procedures.
- B. Product Data: Submit manufacturer’s data on manufactured products showing compliance with specified requirements and installation instructions.
  1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives and/or mortars.
- C. Mix Design: Submit proposed concrete mix designs:
  1. Employ an independent testing laboratory to test proposed aggregate and design

concrete mixes for each type of concrete required.

2. For each submitted mix design, provide the area of structure for which it will be used.
  3. Submit aggregate test reports and mix designs for approval 14 days prior to placing concrete.
  4. Test each type of fine and coarse aggregate for conformance to ASTM C33.
  5. Design mixes in accordance with ACI 301, Section 3.8.2, Method 1 or Method 2.
  6. Pour Plan Drawings that show the extent of each pour and their sequence in plan. Include joints, penetrations, and embedments. Use the most recent MEP, Structural and Architectural Drawings to determine locations of all penetrations and embedded items, include element diameter and diameter required for block-outs.
  7. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction for concrete accessories.
  8. Include Contractor's Certification that the proposed mix designs have been reviewed by admixture manufacturers and all additives, admixtures, surface color treatments, form release agents and curing methods are compatible.
- D. Samples:
1. Submit two, 6 inch-long samples of construction joint devices to be used.
- E. Test Reports: Submit report for each test or series of tests specified.
- F. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
- G. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

#### **1.05 QUALITY ASSURANCE**

- A. Perform work of this section in accordance with ACI SPEC-301, ACI CODE-318, and ACI CODE-350 where applicable. Maintain one copy of each document on site.
- B. Follow recommendations of ACI 305 when concreting during hot weather.
- C. Follow recommendations of ACI 306 when concreting during cold weather.
- D. Pre-pour meeting: Contractor to conduct pre-pour conference whenever concrete is poured, at project site with all interested parties, including:
  1. Contractor's superintendent
  2. Independent testing agency responsible for concrete testing and reinforcing steel inspection
  3. Ready mix concrete manufacturer
  4. Concrete subcontractor's supervisor and concrete placer
  5. Owner's representative
  6. Engineer-of-Record or its designee
- E. Review at Pre-pour meeting the following topics:
  1. Items allowed and embedded in concrete.
  2. Special mix design; color and admixtures; batch control procedures.

3. Placement and inspection of waterstops.
  4. Construction joint preparation and approval.
  5. Testing and inspection agency procedures for ensuring field quality control.
  6. Concrete truck access to site, truck weights, concrete placement techniques, pour timing durations.
  7. Concrete consolidation techniques.
  8. All chemical admixtures proposed to be used.
  9. Finishing and finishes; hours of operation; noise generated
  10. Curing and protection.
  11. Concrete repair procedures, and concrete protection.
  12. Watertight testing procedures and schedule.
  13. Noise Considerations.
- F. The Contractor shall select a qualified concrete supplier and placer that is capable and experienced in meeting the specified project requirements.
- G. The concrete supplier shall be certified by the National Ready Mix Concrete Association and shall hold a valid certificate of conformance for concrete production facilities.
- H. Formwork Standards: Unless otherwise indicated, design construct, erect, maintain, and remove forms and related structures for concrete work in accordance with the applicable requirements of ACI 301, ACI 318, ACI 347, and ACI 350.
- I. Formwork Surface Materials: Provide material and work quality which will produce clean and uniform finished surfaces within the allowable tolerances specified and which will conform to the following requirements:
1. Concrete Exposed to View: Provide material and work quality that will produce clean, smooth, and uniform concrete surfaces. Refer to Architectural Drawings for additional finish requirements.
  2. Concrete Concealed from View: Provide material and work quality that will produce aligned concrete surfaces free of fins, honeycomb, and stains, and as required by ACI 301, where more stringent, for wall and slab construction.

#### **1.06 TESTS**

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 – Quality Requirements.
- B. Testing and analysis of concrete will be performed in accordance with ACI 301 except as supplemented or modified by these Specifications.
- C. Concrete test samples shall be obtained as near as possible to its final placement location. For pumped mixes, test samples shall be obtained at the hose discharge end.
- D. Air content tests shall be performed at the point of discharge for each concrete batch delivered to the site.
- E. Three (3) concrete test cylinders for strength tests of concrete placed each day shall be taken not less than once a day, nor less than once for each 7 cubic yards of concrete, nor

less than once for each 250 square feet of surface area.

- F. One (1) additional test cylinder will be taken during cold weather and cured on site under same conditions as concrete it represents.
- G. Extra cylinders taken at Contractor's request shall be paid for by Contractor.
- H. One (1) slump test and a unit weight shall be taken from the same concrete sample as each set of compressive strength test cylinders cast.
- I. Load Tests of Cores: Should concrete test cylinders fail to meet specified strength requirements. Contractor shall make load tests or core the section as directed by Engineer. Contractor shall cooperate with and furnish material to testing laboratory. The Contractor shall pay for all costs of load tests and core tests.

#### **1.06 COORDINATION**

- A. Section 01 30 00 – Administrative Requirements: Coordination and project conditions.

### **PART 2 - PRODUCTS**

#### **2.01 FORMWORK AND ACCESSORIES MATERIALS**

- A. Comply with requirements of Section 03 10 00 – Concrete Forming and Accessories.

#### **2.02 REINFORCEMENT MATERIALS**

- A. Comply with requirements of Section 03 20 00 – Concrete Reinforcement.

#### **2.03 CONCRETE MATERIALS**

- A. Cement: ASTM C150, Type I/II Portland type, low alkali, unless noted otherwise in Structural Drawings. Use one brand throughout project.
- B. Fine and Coarse Aggregates: ASTM C33.
  - 1. Acquire aggregates for entire project from same source.
  - 2. Clean and uniformly graded from 3/8" to maximum size indicated or specified.
  - 3. When not specified, provide 3/4" maximum size aggregate.
  - 4. Deleterious material in aggregates shall not exceed the limits specified in ASTM C33.
- C. Fly Ash: ASTM C618, Class F, with a maximum of 25 percent retained on the No. 325 mesh sieve and a loss of ignition of 1.0 percent maximum.
- D. Calcined Pozzolan: ASTM C618, Class F.
- E. Silica Fume: ASTM C1240, proportioned in accordance with ACI 211.1.

- F. Ground Granulated Blast Furnace Slag: ASTM C989.
- G. Corrosion Inhibitor
  - 1. Conform to ASTM C494, Type C.
  - 2. Manufacturer and product:
    - a. GCP Applied Technologies, DCI.
    - b. Masterlife CI 30.
- H. Water: ASTM C1602; clean potable, and free of impurities detrimental to concrete, admixtures, reinforcing bars, or other embedments in the concrete.

#### **2.04 ADMIXTURES**

- A. Chemical Admixtures – See General Notes on the Structural Drawings. No admixtures, including water, shall be added outside the approved mix designs.
  - 1. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
  - 2. Provide all admixtures from one source. For any exception to this, request approval from the Engineer-of-Record.

#### **2.05 CONCRETE MIX DESIGN**

- A. Design of concrete mixes, including recommended amounts of admixture and water to be used in the mixes, shall be obtained by the Contractor from a qualified independent testing laboratory or agency, or from a mill or ready-mix plant, properly equipped to design concrete mixes. The design shall be performed and certified by a Professional Engineer licensed in the State where the Work is located. The laboratory, agency, mill, or ready-mix plant shall meet applicable requirements of ASTM E329 and shall be approved by the Engineer. Costs of obtaining the mix designs shall be paid by the Contractor.
- B. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer to meet the performance requirements indicated in the Construction Documents. Ensure that mix designs will produce concrete suited for proper placement and finishing.
- D. If concrete is to be placed by pumping, concrete mixes shall be designed in accordance with the applicable requirements of ACI 304 and shall include strengths and slumps.
- E. Mix designs shall indicate the location of each mix within the structure. Mix designs shall specify both coarse and fine aggregate sources.
- F. Upon receipt of acceptable mix designs from the prequalified testing laboratory or agency or concrete supplier, conforming with specified requirements, the Contractor shall submit these accepted mix designs to the Engineer for review, 21 days prior to batching or delivering any concrete.
- G. Admixtures containing calcium chloride shall not be permitted.

- H. Maximum shrinkage: ASTM C157; 0.035% at 28 days.

## **2.06 MIXING**

- A. Batching, mixing, and transporting Portland cement concrete shall conform to the applicable requirements of ACI 301 and ACI 304.
- B. Transit Mixers: Concrete shall be central-mixed concrete from a central batch plant, to be transported to the jobsite in a truck mixer, in accordance with the requirements of ASTM C94. Equipment used in the manufacture of concrete shall be kept clean at all times.
- C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump as indicated in the approved mix-design submittal.
- D. Concrete in truck mixer shall be mixed continuously until discharged. The discharge time for concrete after the introduction of mixing water shall not exceed 60 minutes. The discharge time for concrete after cement has been mixed with aggregate shall not exceed 90 minutes. Delivery tickets shall show departure time from plants.
- E. Mixers shall be equipped with automatic devices for recording the number of revolutions of the drum prior to completion of mixing operation. Each transit mixer shall also be equipped with water measuring devices consisting of either accurately calibrated water tanks or water meters.
- F. Ready-mixed concrete shall be mixed for a period of not less than 10 minutes and at least 3 minutes of the mixing period shall be immediately prior to discharging at the job. The introduction of additional water into transit type mixers after leaving the plant will not be permitted.

## **2.06 CURING MATERIALS**

- A. Curing Blankets complying with ASTM C171, approved products:
  - 1. SIKA UltraCure NCF.
  - 2. SIKA UltraCure DOT.
  - 3. ReliableCure SOG.
- B. Water: Potable, not detrimental to concrete.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Section 01 30 00 – Administrative Requirements: Coordination & Project Conditions.
- B. Verify requirements for concrete cover over reinforcement.
- C. Verify anchors, seats, plates, reinforcement, and other items to be cast into concrete are

accurately placed, held securely, and will not interfere with placing concrete.

### **3.02 PREPARATION**

- A. Formwork: Comply with requirements of ACI 301 and Section 03 10 00 – Concrete Forming and Accessories.
- B. Prepare previously placed concrete surfaces to receive concrete in accordance with Section 03 01 30 – Concrete Surface Preparation for Overlay.
- C. In locations where new concrete reinforcement is doweled to existing work, drill holes in existing concrete perform work in accordance with Section 03 15 00.01 – Concrete Accessories – Adhesive Anchors.
- D. Remove standing water from areas receiving concrete before concrete is placed.

### **3.03 STORAGE OF MATERIALS**

- A. All materials to be used by Contractor shall be stored in a clean, dry place, free of contaminating substances.

### **3.04 FORMWORK**

- A. Provide bracing to ensure stability of formwork. Strengthen formwork liable to be overstressed by construction loads.
- B. The forms shall be held in place to prevent any offsets in panel edges. Panels shall be constructed to maintain a true aligned surface.
- C. Construct formwork to maintain tolerances in accordance with ACI 301.

### **3.05 FORM REMOVAL**

- A. Do not remove forms and shoring until concrete has sufficient strength to support its own weight and construction and design loads which may be imposed upon it.
- B. During cold weather, remove ice and snow from forms. Do not use de-icing salts. Do not use water to clean out completed forms, unless formwork and construction proceed within heated enclosure. Use compressed air to remove foreign matter.
- C. Do not damage concrete surfaces during form removal.
- D. Store reusable forms for exposed architectural concrete to prevent damage to contact surfaces.

### **3.06 PLACING CONCRETE**

- A. Notify Testing Agency minimum 24 hours prior to commencement of concreting operations.

- B. Place concrete in accordance with ACI 301.
- C. Hot Weather Placement: In accordance with ACI 301.
- D. Cold Weather Placement: In accordance with ACI 301 and 306.1.
- E. Install construction joint devices in coordination with the overlay slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- F. Ensure reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.
- G. Temperature of concrete as placed shall not exceed 90 degrees F.
- H. The concrete shall be manipulated and struck off slightly above final grade. The concrete shall then be consolidated and finished to final grade with surface-vibration devices. Consolidation equipment used shall be approved by the Engineer.
- I. Deposit concrete at final position. Prevent segregation of mix.
- J. All concrete shall be placed in continuous operation and terminated only at designated control and pour joint predetermined locations.
- K. Provide continuous water misting of the fresh concrete surface during finishing operations to prevent rapid drying and cracking of the finish surfaces.
- L. Consolidate concrete.
- M. Place concrete continuously. Do not break or interrupt successive pours such that cold joints occur unless noted otherwise on Drawings.
- N. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
- O. Maintain Records of concrete placement. Record date, location, quantity, air temperature, and test sample taken.

### **3.07 SLAB JOINTING**

- A. Locate joints as indicated on Drawings.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
  - 1. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.
- D. Install joint devices in accordance with manufacturer's instructions.

- E. Apply sealants in joint devices in accordance with Section 07 92 00.
- F. Place concrete continuously between predetermined expansion, isolation, and construction joints. Do not interrupt successive placement; do not permit cold joints to occur.
- G. Saw Cut Slab Contraction Joints: Saw cut slabs using soft cut method over green concrete as soon as slab will support foot traffic and before slab begins to experience shrinkage cracking unless shown otherwise on the Drawings.
  - 1. Space saw-cuts per ACI 360R and as follows:
    - a. At interior 4"-6" thick slabs and topping slabs, place at maximum 15'-0" oc
  - 2. Saw-cut joints minimum 1 inch deep and not less than 1/4 depth of concrete slab. Use a 3/16" wide blade.
  - 3. Saw-cut joints at 45-degree angle from corner of diamond shaped slab panels.
  - 4. Locate contraction joints along column centerlines, and under partition walls where feasible.
  - 5. Maximum length to width ratio of panels in floor slabs is 1.5 to 1, although 1 to 1 is preferred.
  - 6. Do not form T-shaped or L-shaped saw-cut joints in panels.
  - 7. Make joints continuous. Do not offset or stagger.
  - 8. Space contraction joints equal distance between contraction joints at column lines, over construction joints, supporting structural beams, and change of substrate.
  - 9. Burnish edges of joints while concrete is still green.
- H. Construction Joints: Where not otherwise indicated, use metal combination screed and key form, with removable top section for joint sealant.

### **3.08 CONCRETE FINISHING**

- A. Finish concrete in accordance with ACI 301, ACI 302.1 and Section 03 35 00 – Concrete Finishes.

### **3.09 CURING**

- A. Curing shall be in strict accordance with ACI 301 and ACI 308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury.
- B. Concrete temperature shall be held between 50 and 90-degrees F and in a continuously moist condition for at least the first ten (10) days after placement. Use moist curing mats/blankets to assure retention of moisture. Spray with water as necessary to avoid excessive moisture loss at relatively constant temperature.

### **3.10 FIELD QUALITY CONTROL**

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.

B. Inspection and Testing Services:

1. The Contractor shall keep records of all concrete placed. Copies of such records shall be submitted to the Contractor, Architect, and Engineer of Record (Engineer).
2. Provide free access to concrete operations at project site and cooperate with appointed firm.
3. Testing services for the Owner's quality control program, including concrete strength tests, will be provided by an independent testing laboratory or agency, procured by the Owner and approved by the Engineer, and will be performed in accordance with the applicable requirements of ACI 301. If, as a result of these tests, it is determined that the specified concrete properties are not being obtained, the Engineer will order such changes in proportions or materials, or both, as may be necessary to secure the specified properties.
4. Failure of the Engineer to detect defective work or material shall not prevent later rejection when such defect is discovered, nor shall it obligate the Engineer for final acceptance.
5. Additional inspection and testing services required by the Engineer because of changes in materials, sources, or proportions; or occasioned by failure of inspections and tests to meet specification requirements, shall be paid for by the Contractor.

C. Methods of Sampling and Testing:

1. Sampling: Representative composite samples will be taken by the Testing Agency in accordance with ASTM C172. Each sample shall be obtained from a different batch of concrete on a random basis.
2. Slump Tests: The above-specified Testing laboratory will perform slump tests of concrete during placing of concrete, as required, in accordance with ASTM C143. At least one test will be performed at the delivery trucks for each 50 cubic yards of concrete delivered.
3. Tests for Concrete Temperature: Freshly mixed concrete will be tested hourly when the ambient temperature is below 40 degrees F and above 80 degrees F, and each time compression test cylinders are made. The concrete temperature will be recorded on all compression test cylinders made. Refer to Referenced Standards herein for hot and cold weather remedial requirements.
4. Strength Tests:
  - a. The minimum number of test cylinders to be made for each class of concrete and for each placement shall be four cylinders for each 100 cubic yards or fraction thereof. When additional sets of test cylinders are required beyond the normal seven and 28-day tests, each set shall consist of a minimum of two test cylinders.
  - b. All cylinders in a set will be marked with a unique number on one end. The Contractor shall record this number on the record of concrete placed. All cylinders shall be cured by the Contractor's independent testing laboratory.
  - c. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
  - d. From each set of cylinders cast, one cylinder shall be tested at seven days and two cylinders at 28 days in accordance with ASTM C39. If the 28-day tests are satisfactory, the fourth cylinder shall be discarded.
  - e. In the event the 28-day tests are below the specified strength requirements, the Laboratory shall then test the fourth cylinder at the age selected by the Engineer.
5. Tests for Contractor's Benefit: Tests required to verify early form removal, or other reasons for the Contractor's benefit, shall be performed at Contractor's expense as part

of the Contractor's quality control program.

- D. Evaluation and Acceptance of Tests:
1. Acceptance of Concrete: The strength of the concrete shall be considered satisfactory, provided the averages of all sets of three consecutive strength test results equal or exceed the specified 28-day compressive strength, and no individual strength test result falls below the specified 28-day compressive strength by more than 500 psi.
  2. Adjustments: The Independent testing laboratory will order adjustments to the mix proportions, increase in the minimum cement content, additional curing of the structure, or any combination of the above when strength tests acceptance criteria specified are not being met.
  3. Test Cores:
    - a. When laboratory test results indicate concrete to be more than 300 psi below the specified strength, or if there is a likelihood of low strength concrete, a significant reduction in load-carrying capacity, or absence of desired durability or watertightness (for aquatic concrete) in the concrete, the Engineer will require tests of cores to be drilled from the areas in question.
    - b. Test cores shall be obtained from each member or area of suspect strength, from locations designated by the Engineer, and test specimens shall be prepared by the Contractor in accordance with ASTM C42.
    - c. Three cores shall be taken for each determination of in-place strength. Concrete in the area represented by the core tests will be considered structurally adequate if the average of the three cores is equal to at least 85 percent of the specified design strength and no single core is less than 75 percent of the design strength. Locations represented by erratic core strengths shall be retested at the direction of the Engineer.
    - d. Fill core holes by methods approved by the Engineer.
  4. Rejection of Concrete; Repair and Replacement: The Engineer shall have authority to reject concrete work which does not meet specification requirements, and to require repair or replacement as necessary to complete the Work.
- E. Acceptance of Structure: Acceptance of the completed standard concrete work requires conformance with the dimensional tolerances, appearance, and strengths specified in these Specifications, in ACI 301, and in ACI 117. Acceptance of the completed Aquatic Concrete work has the additional requirement of watertightness as defined by ACI 350.1 and the requirements stated herein, and as noted at rebates on the Acrylic Panel manufacturer's shop drawings.

### **3.11 DEFECTIVE CONCRETE**

- A. Test Results: The testing agency shall report test results in writing to the Owner's representative and Structural Engineer within 48 hours of the test.
- B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

### **3.12 PROTECTION**

- A. Do not permit traffic and other activities over unprotected concrete floor surface until fully cured.
- B. Protect in-place concrete in accordance with ACI 301, Section 1.8, and as follows:
  - 1. Cover to protect interior exposed concrete slabs subject to foot traffic or other damage with clean, unwrinkled kraft curing paper.
  - 2. Stack and stockpile materials and equipment in manner to prevent mechanical and chemical damage to concrete surfaces. Maintain stacking and stockpiling loading within structural tolerances.
  - 3. Contain and promptly clean spills to maintain concrete suitable for bonding of finish flooring and final finishing of exposed concrete slabs.

**END OF SECTION**

## **PART 1 – GENERAL**

### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Finishing concrete slabs.
  - 2. Floor surface treatment.
  
- B. Related Sections:
  - 1. Section 03 30 00 – Cast-in-Place Concrete.
  - 2. Section 07 92 00 – Joint Sealants.
  - 3. Section 09 30 19 – Swimming Pool Ceramic Tile.

### **1.02 REFERENCES**

- A. American Concrete Institute:
  - 1. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials.
  - 2. ACI 301 - Specifications for Structural Concrete.
  - 3. ACI 302.1 - Guide for Concrete Floor and Slab Construction.
  
- B. ASTM International:
  - 1. ASTM E1155 - Standard Test Method for Determining Floor Flatness and of Levelness Using the F-number System.

### **1.03 SUBMITTALS**

- A. Relevant sections of Division 1.
  
- B. Product Data: Submit data for curing papers and slip resistant treatment, compatibilities, and limitations.

### **1.04 CLOSEOUT SUBMITTALS**

- A. Relevant sections of Division 1.

### **1.05 QUALITY ASSURANCE**

- A. Perform Work in accordance with ACI 301 and ACI 302.1.

### **1.06 QUALIFICATIONS**

- A. Installer: Company specializing in performing the work in this section with minimum ten (10) years documented experience.

### **1.07 MOCK-UP**

- A. Section 01 45 00 – Quality Control: Requirements for mockup.

- B. Construct mock-up area under conditions similar to those which will exist during actual placing, 8 feet long by 8 feet wide, with specified finishes and curing methods applied.
- C. Locate mock-up as part of the pour schedule pattern(s) identified on the Drawings at location directed by the Architect/Engineer.
- D. Incorporate accepted mock-up as part of the work.

#### **1.08 COORDINATION**

- A. Coordinate the work with concrete floor placement and curing.

### **PART 2 – PRODUCTS - NOT USED**

### **PART 3 – EXECUTION**

#### **3.01 EXAMINATION**

- A. Relevant sections of Division 1.
- B. Verify floor surfaces are acceptable to receive the Work of this section.

#### **3.02 FLOOR FINISHING**

- A. Finish concrete floor surfaces in accordance with ACI 301-16 and ACI 302.1R-15.
- B. Slab Finish: Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete to attain a set sufficient for floating and supporting the weight of the finisher and equipment. If bleedwater is present prior to floating the surface, drag the excess water off or remove by absorption with porous materials. Do not use dry cement to absorb bleedwater.
  - 1. Floated:  
Use for surfaces to receive waterproofing membranes and exterior slabs where not otherwise specified. After the concrete has been placed, consolidated, struck off, and leveled, do not work the concrete further, until ready for floating. Whether floating with a wood, magnesium, or composite hand float, with a bladed power trowel equipped with float shoes, or with a powered disc, float shall begin when the surface has stiffened sufficiently to permit the operation. During or after the first floating, surface shall be checked with a 10-foot straightedge applied at no less than two different angles, one of which is perpendicular to the direction of strike off. High spots shall be cut down and low spots filled during this procedure to produce a surface level within 3/16 inch in 10 feet.
  - 2. Broomed:  
Medium Broom Finish – Brooming texture to be approved by Engineer. Permit surface to harden sufficiently to retain the scoring or ridges. Broom transverse to traffic or at right angles to the slope of the slab.
- C. Place floor slabs in pattern indicated on plans.

- D. Screed floors maintaining surface flatness as noted herein. Pitch surfaces uniformly to drains.

### **3.03 FLOOR TOLERANCES**

- A. Relevant sections of Division 1.
- B. Measure for  $F_f$  and  $F_l$  tolerances for floors in accordance with ASTM E1155, within 48 hours of placing concrete slab and prior to removal of forms.
- C. Finish concrete to achieve the following tolerances:
  - 1. Floor surface classification: Flat.
  - 2. Specified overall flatness:  $SOF_f$  35.
  - 3. Specified overall levelness:  $SOF_l$  25.
  - 4. Minimum local values for flatness ( $MLF_f$ ) and levelness ( $MLF_l$ ) shall equal 3/5 of  $SOF_f$  and  $SOF_l$  values, respectively.
- D. Correct the slab surface if tolerances are less than specified and as required to slope to drain.
- E. Correct defects in defined traffic floor by removal and replacement of defective Work. Areas requiring corrective Work will be identified. Re-measure corrected areas by same process.

**END OF SECTION**

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

- A. Project Drawings and general provisions of the Construction Contract, including General and Supplementary Conditions, Division 01 Specification Sections and bidding requirements, apply to the work of this Section.
- B. Technical publications, standards, and reference documents as outlined in individual Technical Specification Sections and as indicated on the Project Drawings.

### 1.02 SUMMARY

- A. This Section includes a concrete topping that contains a blend of Portland cements and other hydraulic cements.
  - 1. ARDEX K 301™ Exterior Self-Leveling Concrete Topping
  - 2. ARDEX ARDIFIX™ Low Viscosity Polyurethane Crack Repair
  - 3. ARDEX EP 2000™ Substrate Preparation Epoxy Primer
  - 4. ARDEX CG™ Concrete Guard 2.0

### 1.03 REFERENCES

- A. ASTM C 109M, Compressive Strength Air-Cure Only
- B. ASTM C348, Flexural Strength of Hydraulic-Cement Mortars

### 1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, a Revit file with applicable materials meeting the Revit Content Style Guide, and installation instructions for each material and product used. Include manufacturer's Safety Data Sheets.
- B. Qualification Data: For Installer

### 1.05 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: The manufacturer shall be a company with at least five years' experience and regularly engaged in the manufacture and marketing of products specified herein. Contact Manufacturer Representative prior to installation. Installation of the ARDEX product must be completed by a factory-trained installer, certified applicator, such as an ARDEX Level-Master® Elite – Polished Concrete or Polished Preferred Contractor, using mixing equipment and tools approved by the manufacturer. Contact ARDEX Americas at (724) 203-5000 for a list of recommended installers.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in original packaging, labeled with product identification, manufacturer, batch number and shelf life.
- B. Store products in a dry area with temperature maintained between 50° and 85° F (10° and 29° C) and Protect from direct sunlight.
- C. Handle products in accordance with manufacturer's printed recommendations.

1.07 PROJECT CONDITIONS

- A. Do not install material below 50°F (10°C) surface and air temperatures. These temperatures must also be maintained during and for 48 hours after the installation of products included in this section. Install quickly if substrate is warm and follow warm weather instructions available from the ARDEX Technical Service Department.

PART 2 - PRODUCTS

2.01 HYDRAULIC CEMENT UNDERLAYMENT

- A. Self-Leveling Concrete Topping
  - 1. Acceptable Products:
    - a. ARDEX K 301™; Manufactured by ARDEX Americas, USA, (724) 203-5000, [www.ardexamericas.com](http://www.ardexamericas.com)
  - B. Performance and Physical Properties: Meet or exceed the following values:
    - 1. Application: Barrel Mix or Pump
    - 2. Walkable: 2 – 3 hours
    - 3. Flow Time: 10 minutes
    - 4. Compressive Strength: 4300 psi at 28 days, ASTM C109M.
    - 5. Flexural Strength: 1000 psi at 28 days, ASTM C348.
    - 6. Colors: Light Gray
- C. Or approved equal.

2.02 ARDEX ARDISEAL™ RAPID PLUS Semi-Rigid Joint Sealant; manufactured by ARDEX Americas, USA, (724) 203-5000, [www.ardexamericas.com](http://www.ardexamericas.com)

2.03 ARDEX ARDIFIX™ Low Viscosity Polyurethane Crack Repair; Manufactured by ARDEX Americas, USA, (724) 203-5000, [www.ardexamericas.com](http://www.ardexamericas.com)

2.04 ARDEX EP 2000™ Substrate Preparation Epoxy Primer; Manufactured by ARDEX Americas, USA, (724) 203-5000, [www.ardexamericas.com](http://www.ardexamericas.com)

2.05 SEALER: ARDEX CG™ Concrete Guard™; Manufactured by ARDEX Americas, USA, (724) 203-

5000, [www.ardexamericas.com](http://www.ardexamericas.com)

2.06 WATER: Water shall be clean, potable, and sufficiently cool (not warmer than 70°F).

### PART 3 – EXECUTION

#### 3.01 PREPARATION

- A. Concrete Subfloors: Prepare substrate in accordance with manufacturer's instructions.
  - 1. All concrete subfloors must be sound, solid, clean, and free of all oil, grease, dirt, curing compounds and any substance that might act as a bond breaker before priming. Mechanically clean to a minimum ICRI surface profile of CSP 3. Acid etching and the use of sweeping compounds and solvents are not acceptable.
- B. Joint and Crack Preparation:
  - 1. All Joints and Moving Cracks – Under no circumstances should ARDEX K 301™ be installed over any joints or moving cracks. All joints and moving cracks may be filled with ARDEX ARDISEAL™ Rapid Plus Semi-Rigid Joint Sealant.
  - 2. Dormant Cracks – Fill dormant cracks greater than 1/32" with ARDEX ARDIFIX™ Low Viscosity Rigid Polyurethane Crack & Joint Repair.

#### 3.02 APPLICATION OF ARDEX K 301™

- A. Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.
- B. Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas from contact due to mixing and handling of materials.
- C. Priming:
  - 1. Install ARDEX EP 2000™ Substrate Preparation Epoxy Primer. Apply the freshly mixed epoxy to the prepared surface using a short-nap paint roller or notched squeegee with back rolling for smoother surfaces and a longer nap for more uneven substrates. ARDEX EP 2000™ can also be worked into the surface with a paintbrush for hard-to-reach areas and corners
    - a. While in a fresh state, broadcast in-excess of fine sand (less than 1/50" in grain size or 98.5% passing sieve size #30 or #35) consistently over the entire area. After 16 hours, broom sweep and vacuum the surface to remove all loose sand. ARDEX recommends wearing an N-95 dust mask when broadcasting and sweeping up the excess sand
- D. Mixing: Comply with manufacturer's printed instructions and the following.
  - 1. When mixing sanded materials, ARDEX recommends using the ARDEX DUSTFREE™ or a standard "gutter hook" vacuum attachment in combination with a wet/dry (Shop-Vac® style) vacuum and HEPA dust extraction vacuum system. Additionally, each bag should be handled with care and emptied slowly to avoid creating a plume of dust. Contact the ARDEX Technical Service Department for more details on ARDEX products and air

quality management.

2. ARDEX K 301™ is mixed two bags at a time. Mix each 50 lb. (22.7 kg) bag with 5 quarts (4.73 L) of clean water.
  3. Mix using a 1/2" (12 mm) heavy-duty mixing drill (650 rpm) with an ARDEX T-1 mixing paddle. Do not overwater.
  4. Aggregate mix: For areas with thicknesses greater than 3/4" (19 mm), aggregate may be added to reduce material costs. Mix ARDEX K 301™ with water first, then add 1-part aggregate by volume of washed, well-graded pea gravel aggregate (1/8" to 3/8"; 3 to 9.5 mm). Do not use sand. If the aggregate is wet, reduce the amount of water to avoid overwatering. Note: The addition of aggregate will diminish the workability of the product and may make it necessary to install a finish coat to obtain a smooth surface. ARDEX recommends a finish coat to obtain a smooth surface. Allow the initial application to dry for 24 hours, and then prime this layer with ARDEX EP 2000™ and sand broadcast. All the primer to dry 16 hours before removing all excess sand and installing the neat coat of ARDEX K 301™.
  5. For pump installations, ARDEX K 301™ shall be mixed using the ARDEX ARDIFLO™ Automatic Mixing Pumps. Contact ARDEX Technical Service Department (724) 203-5000 for complete pump operation instructions.
- E. Application: Comply with manufacturer's printed instructions and the following.
1. ARDEX K 301™ may be installed at a minimum thickness of 1/4" (6 mm) up to 3/4" (19 mm) over large areas neat and up to 2" (5 cm) with the addition of proper aggregate.
  2. Pour or pump the liquid ARDEX K 301™ onto the substrate and spread in place with the ARDEX T-4 Spreader. Immediately smooth the material with the ARDEX T-5 Smoother. Wear non-metallic cleats to avoid leaving marks in the liquid ARDEX K 301™.
- F. Curing
1. Although ARDEX K 301™ requires no special curing procedures, avoid applying this product if rain is expected within 6 to 8 hours, or if freezing temperatures could occur within 48 hours of application. As with any cementitious material, the above conditions can alter the appearance and performance of the topping.
- G. Sealing
1. The surface of ARDEX K 301™ must always be protected from oil, salt, water and surface wear by applying a suitable protection system. ARDEX recommends the use of ARDEX CG™ Concrete Guard 2.0 to seal ARDEX K 301™ that will be exposed to normal foot traffic.
  2. For areas to receive heavier traffic, sealing should be done using an appropriate wear protection coating. As the performance of the coating systems varies greatly, the installer is responsible for assessing the suitability of these coatings.
    - a. If ARDEX CG™ Concrete Guard 2.0 or a waterborne sealer is to be applied at a thickness not-to-exceed a total of 20 mil (500 microns), the coating can be applied to the surface of the ARDEX K 301™ after 24 hours at 70°F (21°C).
    - b. When using a solvent-borne or 100% solids coating applied at a total thickness of

20 mils (500 microns) or less, the ARDEX K 301™ must cure for a minimum of 48 – 72 hours at 70°F (21°C).

- c. When the total application thickness will exceed 20 mils (500 microns), the ARDEX K 301™ must cure 7 days at 70°F (21°C) prior to installing the protection layer.

### 3.03 FIELD QUALITY CONTROL

- A. Where specified, field sampling of the Ardex topping is to be done by taking an entire unopened bag of the product being installed to an independent testing facility to perform compressive strength testing in accordance with ASTM C 109/modified: air-cure only. There are no in situ test procedures for the evaluation of compressive strength.

END OF SECTION

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes grout for hollow metal frames at concrete walls.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division- 01 Specification sections, apply to work of this section.

1.03 QUALITY ASSURANCE

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

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver in original unopened containers and store under cover.

1.05 SUBMITTALS

- A. Product Data for grout.

1.06 QUALITY ASSURANCE

- A. Obtain grout ingredients of a uniform quality, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

PART 2 – PRODUCTS

2.01 GROUT FOR HOLLOW METAL FRAME ASSEMBLIES

- A. Grout for Hollow Metal Frames: perolized gypsum material - "Struct-O-Lite or approved equal.
- B. Substitutions under provisions of Division 01.

PART 3 – EXECUTION

3.01 GROUTING HOLLOW METAL FRAMES

- A. Fill joints, voids, pockets, etc. completely full. Finish surfaces smooth that are exposed to view.
- B. Grout all hollow metal frames.

END OF SECTION

## **PART 1 - GENERAL**

### **1.01 SCOPE OF WORK**

- A. Repair of cracks in the concrete as indicated on the Drawings or as directed by the Engineer on a unit cost basis.

### **1.02 RELATED SECTIONS**

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Addenda, and Sections in Division 1 of these Specifications.
- B. Section 03 01 30 - Surface Preparation for Overlay.
- C. Section 03 01 30.71 - Concrete Rehabilitation.
- D. Section 03 30 00 - Cast-In-Place Concrete.

### **1.03 REFERENCES**

- A. American Society for Testing and Materials.
  - 1. ASTM C881 - Standard Specification for Epoxy Resin-Base Bonding Systems for Concrete.
  - 2. ASTM C882 - Bond Strength of Epoxy Resin Systems Used with Concrete.
  - 3. ASTM D570 - Test Method for Water Absorption of Plastics.
  - 4. ASTM D638 - Test Method for Tensile properties of Plastics.
  - 5. ASTM D695 - Compressive Properties of Rigid Plastics.
- B. American Concrete Institute.
  - 1. ACI 503.2 - Standard Specification for Bonding Plastic Concrete to Hardened Concrete to Hardened Concrete with a Multi-Component Epoxy Adhesive.
  - 2. ACI 503.4 - Standard Specification for Repairing Concrete with Epoxy Mortars.
  - 3. ACI 503.7 – Specification for Crack Repair by Epoxy Injection.
  - 4. ACI 504R - Guide to Joint Sealants for Concrete Structures.
- C. International Concrete Repair Institute.
  - 1. ICRI 110.2-2020 – Guide Specification for Epoxy Injection.
  - 2. ICRI 210.IR-2016 - Guide for Verifying Field Performance of Epoxy Injection of Concrete Cracks.
- D. American National Standards, Inc.
  - 1. ANSI Z129.1 - Precautionary Labeling of Hazardous Industrial Chemicals.
  - 2. K68.1 - Guide for Classifying and Labeling Epoxy Products According to their Hazardous Potentialities.

### **1.04 QUALIFICATION ASSURANCE**

- A. Applicator's Qualifications: Epoxy injection shall be performed by a certified Applicator. The Applicator shall have a minimum of five (5) years of documented experience in successful repair projects on concrete structural components. The Applicator's qualifications shall be submitted to the Engineer at least two weeks before commencement of epoxy injection work.
- B. Workman's Qualifications: Applicator's workmen engaged in the epoxy injection process on concrete structural components shall have satisfactorily completed a program of instruction in the methods of restoring concrete structures utilizing the specific epoxy injection process indicated, or submit evidence of sufficient work experience in utilizing the process.
- C. Workman's Experience: Applicator's workmen engaged in the actual operation of the equipment used shall have a minimum of three (3) years experience in the operation of the same equipment. Workmen shall have participated in a minimum of eight (8) documented concrete repair projects.

#### **1.05 QUALITY ASSURANCE**

- A. Product Manufacturer: Company specializing in manufacturing quality concrete repair products with a minimum of five (5) years experience.
- B. Applicator: Company prequalified per Paragraph 1.04 of this Section.
- C. Dispenser Manufacturer: Written instructions for maintaining equipment and the ratio accuracy.

#### **1.06 REGULATORY REQUIREMENTS**

- A. Conform to all Federal, State and Local regulatory requirements.

#### **1.07 SUBMITTALS**

- A. The Contractor/Subcontractor shall submit the following documentation for approval under provisions of Section 01330 Submittal Procedures.
  - 1. Applicator's Qualifications: A list of projects, dates, locations, contact and contact's telephone number as per Paragraph 1.04A. of this Section.
  - 2. Workman's Qualifications and Experience: Proof of completion of a program of instruction as per Paragraph 1.04B. and 1.04C. of this Section.
  - 3. Epoxy Injection Adhesive: Provide material certifications and test results per Paragraph 2.02B. of this Section.
  - 4. Dispenser Equipment: Written instructions for maintaining equipment and the ratio accuracy.

#### **1.08 INSPECTIONS**

- A. Comply with the provisions of Paragraph 3.04 of this Section.

#### **1.09 PERFORMANCE**

- A. Designated cracks will be injected with epoxy, filling all voids.
- B. Following injection, all porting adapters and the cap shall be removed, leaving the surface of the concrete smooth with no epoxy or sealer materials showing outside of repaired crack width.
- C. The Owner imposes no procedural requirements or restrictions, and therefore will not be influenced by their inclusion or absence in appraisal of unsatisfactory results. The procedures and equipment selected to obtain the specified results are the Contractor's option and the Contractor's responsibility.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Named products are used herein to establish quality and type. The following are acceptable manufacturers.
- B. Injection Epoxy Resin Adhesive:
  - 1. Sika Corporation.
  - 2. BASF.
  - 3. ChemCo Systems, Inc.
  - 4. Simpson Strong-Tie
  - 5. Substitutions in accordance with Section 01 60 00 – Product Requirements.

### **2.02 MATERIALS**

- A. Injection Adhesives.
  - 1. Injection adhesives for cracks that can be sealed on all faces – Use an adhesive conforms to the requirements of ASTM C 881/C 881 M, Type IV, Grade 1, and any additional requirements as defined in the Project Specifications.
  - 2. Injection adhesive for cracks that cannot be sealed on all faces – If all faces of the crack cannot be reached to apply a surface seal, use an injection adhesive that conforms to the requirements ASTM C 881/C 881 M, Type IV, Grades 1, 2 or 3, and has a viscosity that will allow it to achieve and maintain the penetration requirements specified in Section 1.5.7.1.
- B. Primer - Primers shall be used as recommended by the manufacturer.
- C. Epoxy Resin Adhesive for Injection for cracks that can be sealed all faces.
  - 1. Epoxy adhesive used for impregnation shall be an epoxy resin, two-component, low viscosity adhesive containing no solvents or non-reactive dilutants. Acceptable standard for epoxy is BASF “Mater Inject 1500”.
    - a. Epoxy shall be a two-part type, low viscosity epoxy adhesive material containing 100% solids and shall meet or exceed the following characteristics when tested in accordance with the standards specified.

b. Performance Requirements of Cured Adhesive.

<u>Characteristic</u>	<u>Test Method</u>	<u>Results</u>
Bond Strength, Slant Shear	ASTM C882	2,000 psi
Tensile Strength (7 Day)	ASTM D638	7,500 psi
Elongation of Break	ASTM D638	1% min.
Compressive Yield Strength	ASTM D-695	11,000 psi
Heat Deflection Temperature	ASTM D-648	124° F
Compression Modulus	ASTM D-695	250,000 psi

C. Epoxy Injection Adhesive for cracks that cannot be sealed on all faces.

1. Epoxy adhesive used for impegnation shall be an epoxy resin, two-component, low viscosity adhesive containing no solvents. Acceptable standard for epoxy is “MasterInject 1000” BASF.
  - a. Epoxy shall be a two-part, low viscosity material containing 100% solids and shall meet or exceed the following characteristics when tested in accordance with the standards specified.
  - b. Performance Requirements of Cured Adhesive.

<u>Characteristic</u>	<u>Test Method</u>	<u>Results</u>
Bond Strength, Slant Shear	ASTM C882	1,500 psi
Tensile Strength	ASTM D638	7,000 psi
Elongation	ASTM D638	1% min.
Compressive Yield Strength	ASTM D-695	10,000 psi
Heat Deflection	ASTM D-648	120° F min.
Flexural Strength	ASTM D-790	9,500 psi

D. Surface Seal:

1. Description: The surface seal material is that material used to confine the injection adhesive in the joints or cracks during injection and cure.
2. Properties: The surface seal material shall have adequate strength to hold injection fittings firmly in place and to resist injection pressures adequately to prevent leakage during injection and not leave residue or damages on the surface it is removed from.

**2.03 EQUIPMENT**

- A. Equipment for Injection: The equipment used to meter and mix the two injection adhesive components and inject the mixed adhesive into the crack shall be portable, positive displacement type pumps with interlock to provide positive ratio control of exact proportions of the two components at the nozzle. The pumps shall be electric or air powered and shall provide in-line metering and mixing.
  - 1. Discharge Pressure: The injection equipment shall have automatic pressure control capable of discharging the mixed adhesive at any preset pressure up to 200 psi plus/minus 5 psi and shall be equipped with a manual pressure control override.
  - 2. Ratio Tolerance: The equipment shall have the capability of maintaining the volume ratio for the injection adhesive prescribed by the manufacturer of the adhesive within a tolerance of plus/minus 5 percent by volume at any discharge pressure up to 200 psi.
  - 3. Automatic Shut-Off Control: The injection equipment shall be equipped with sensors on both the Component A and B reservoirs that will automatically stop the machine when only one component is being pumped to the mixing head.

## **2.04 QUALITY CONTROL**

- A. Certification and Test Report.
  - 1. Manufacturer shall certify that every batch of material supplied to this Specification meets all of the requirements listed in Paragraph 2.02 of this Section.
- B. Label Information.
  - 1. The label shall include in a clear and distinct manner, the following information:
    - a. Product Name, Lot Number and Manufacturer.
  - 2. ANSI Hazardous Classification (formerly SPI Classification) and appropriate recommended ANSI precautions for handling.
  - 3. Mix ratio by volume.
- C. Storage
  - 1. The containers of the adhesive shall be stored at ambient temperatures below 100 degrees F.
- D. Shelf Life
  - 2. The adhesive has a shelf life of 18 months counted by the date of manufacture. Material older than 18 months shall be tested at the Contractor's expense to establish conformance of the material with this Specification. At the time of re-test, a new shelf life, not exceeding 18 months, shall be established by the manufacturer.

## **PART 3 - EXECUTION**

### **3.01 GENERAL**

- A. Concrete crack repairs shall consist of pressure injection of a high strength, low modulus, low viscosity epoxy bonding material into cracks and construction joint voids where indicated on the Drawings. Both the injection pressure and the two-component epoxy mix ratio are critical to the success of the process repair. In process tests of injection pressure and mix ratio shall be completed as specified herein. Cracks requiring

pressure injection shall be identified by the Engineer by markings adjacent to the crack. A paste gel cap seal is required on all exposed sides of the crack.

### **3.02 CLEANING**

- A. Surfaces adjacent to joints or cracks or other areas of application shall be cleaned of the rubber products, dirt, dust, grease, oil or other foreign matter detrimental to bond of epoxy injection surface seal system. Acids and corrosives shall not be permitted for cleaning.
- B. The entire length of the cracks on each side shall be wire brushed cleaned or sanded to provide a clean, dry surface for application of the capping material.
- C. Knife score, water flush, air blast and vacuum surface to remove all loose debris from cracks to be repaired.

### **3.03 REPAIR AREAS**

- A. At locations as indicated on the Drawings or as directed by Engineer. Lengths of cracks to be repaired shall be identified and directed by the Engineer.

### **3.04 EPOXY INJECTION**

- A. Preparation
  - 1. Surfaces adjacent to and within cracks shall be cleaned to remove all foreign materials including dirt, dust, grease, oil, efflorescence, or other foreign matter and sealing materials detrimental to bond of the epoxy surface seal and epoxy adhesive surface seal and epoxy adhesive injection materials, respectively. Acids and corrosives shall not be permitted for cleaning.
  - 2. Provide entry ports along the crack at intervals of not less than the thickness of the concrete member at that location nor more than 6 inches. Entry ports shall be placed in the capping material along the crack plane on one side of the crack. The entry ports shall be in accordance with epoxy injection material Manufacturer's recommendations. A rotary impact drill used to drill holes 1/4 in. to 3/8 in. larger than the entry port pin size. Allow for curing of the capping material.
  - 3. Apply surface seal material to the face of the crack or end. For through cracks, apply surface seal to all exposed faces.
  - 4. Allow enough time for the surface seal material to gain adequate strength before proceeding with the injection.
- B. Epoxy Injection
  - 1. Injection of epoxy adhesive shall begin at lower entry port and continue until there is an appearance of epoxy adhesive at the next entry port adjacent to the entry being pumped.
  - 2. The mixed epoxy shall be continuously injected through a handheld mixing head and nozzle through an injection port and into the crack opening. To provide full penetration and filling of the crack when injecting from one side, the epoxy shall be injected into the first port at one end of the crack and allowed to rise into the injection tube of the adjacent injection port. At this point, the first injection tube shall be

capped and injection continued at the second port until epoxy rises in the third injection tube. This process shall be continued in sequence along the entire length of the crack until all ports have been filled.

3. If port-to-port travel of epoxy adhesive is not indicated, the work shall immediately be stopped and the Engineer notified.

C. Finishing.

1. When cracks or joints are completely filled, epoxy adhesive shall be cured for sufficient time to allow removal of injection or port sealing devices. After the epoxy has cured, the capping material and injection ports shall be removed from both sides of the crack and the adjacent concrete surfaces restored to their original condition.

D. Field Quality Control.

1. Pressure Test Method. The mixing head of the injection equipment shall be disconnected and the two-component adhesive delivery lines shall be attached to the pressure check device. The pressure check device shall consist of two independent valved nozzles capable of controlling flow rate and pressure by opening or closing the valve. There shall be a pressure gauge capable of sensing the pressure build-up behind each valve. The valves on the pressure check device shall be closed and the equipment operated until the gauge pressure on each line reads 160 psi. The pumps shall be stopped and gauge pressure shall not drop below 150 psi within 3 minutes.
2. Ratio Test Method. The mixing head of the injection equipment shall be disconnected and the two adhesive components shall be pumped simultaneously through the ratio check device. The ratio check device shall consist of two independent valved nozzles capable of controlling back pressure by opening or closing the valve. The discharge pressure shall be adjusted to 180 psi for both adhesive components. Both adhesive components shall be simultaneously discharged into separate calibrated containers. The amounts discharged into the calibrated containers simultaneously during the same time period shall be compared to determine if the volume discharge conforms to the manufacturer's recommendations.
3. Frequency of Testing: The pressure and ratio test for each injection unit shall be run every four (4) hours of operating time of each piece of equipment.
4. Proof of Pressure and Ratio Test.
  - a. At all times during the course of the work the Contractor shall keep complete and accurate records available to the Engineer of the pressure and ratio tests specified above.
  - b. In addition, the Engineer, at any time without prior notification of the Contractor, may request the Contractor to conduct the tests specified above in the presence of the Engineer.

### 3.05 QUALITY ASSURANCE - TESTING AND INSPECTION

- A. Contractor shall provide resin samples from dispenser whenever the Engineer requests them during the course of injection. Sample sizes shall not exceed three (3) fluid ounces.
- B. Contractor shall submit concrete cores taken at cracks repaired by injected epoxy resin adhesives where directed by the Engineer to determine if the specified results are being

obtained. The results as evidenced by the cores shall be the sole criteria in determining compliance with this specification.

1. Taking cores and repairing their core sockets by the Contractor is considered incidental with the work. Contractor shall assume a minimum of three (3) cores will be required.
2. Unless otherwise indicated by the Engineer, cores shall be taken at locations indicated on the drawings. Cores shall be 3 inches in diameter and a minimum of 8 inches in depth. Verify with Engineer prior to taking cores whether reinforcing steel encountered in the coring process can or cannot be cut. The Contractor shall index cores and core locations for future reference.
3. Core Frequency: Epoxy injection shall not proceed beyond the first 200 L.F. of exposed crack until the Engineer has examined and approved 3 cores. After this initial approval, one core for every 250 L.F. is required.
4. Core Inspection and Testing: The Engineer will inspect cores to confirm penetration requirements are met. This review includes wetting cores and examining them carefully as they dry. Fissures not filled with resin will remain damp, and therefore dark after the core surface has dried. Unfilled cracks will be detected in this manner. After reviewing fill of specified voids, demolish the core and inspect the fragments. If no breaks occur on the glue lines, the epoxy injection work performed is acceptable.

**END OF SECTION**

## **PART 1 – GENERAL**

### **1.01 SCOPE**

- A. Furnish all labor, materials, tools and equipment, and perform all operations necessary for embedded in slab metal electrical conduit plus concrete crack and joint water leakage fix with injection grouting work.
- B. Operation joint profile preparation, saturated oakum and closed cell backer rod placement and the injection grouting shall proceed as indicated in the sequence of work.
- C. Injection of grout is for filling voids in embedded metal electric conduit and concrete and for the repair of water leaking cracks.
- D. Holes will be drilled as required and grout injected at cracks. Grout shall be injected under low pressure so as not to damage the existing structure.

### **1.02 RELATED WORK UNDER OTHER SECTIONS:**

- A. Section 03 01 30.71 – Concrete Rehabilitation.
- B. Section 03 15 00.01 – Concrete Accessories – Adhesive Anchors.
- C. Section 03 30 00 – Cast-in-Place Concrete.
- D. Section 07 92 00 – Joint Sealants.
- E. Division 16 – Electrical Work.

### **1.03 SUBMITTALS**

- A. General: Submit in accordance with General Conditions
- B. Product Data: Submit manufacturer's product data sheets and description of recommended uses and installation procedures for each component used in chemical grouting the pool slab joints.

## **PART 2 – PRODUCTS**

### **2.01 CHEMICAL GROUT**

- A. **FOR CONCRETE CRACKS AND JOINTS**  
The sealing materials shall be a polyurethane grout and accelerator system marketed under the names of GCP De Neef Hydro-Active Flex LV with accelerator Hydro-Active Flex Cat supplied by Grace Construction Products, Inc. or approved equal. All materials shall be delivered to the site in undamaged, unopened containers bearing the manufacturer's original labels. Grouting shall be performed in accordance with manufacturer's recommendations. Grouts shall be non-flammable and non-toxic.
- B. **FOR EMBEDDED METAL ELECTRICAL CONDUIT IN CONCRETE SLABS.**

The fill and sealing of metal electrical conduit pipe shall be by polyurethane grout and accelerator system marketed under the names of GCP DeNeef CFL PURE with accelerator Flex Cat PURE as supplied by Grace Construction Products, Inc or approved equal. All materials shall be delivered to site in undamaged, unopened containers bearing the manufacturers original labels. Grouting shall be performed in accordance with manufacturer's recommendations. Grouts shall be non-flammable and non-toxic.

C. CHEMICAL GROUT

The grouting compound shall be a hydrophobic polymer of the isocyanate type which is applied to a defective joint by use of a packer or injection port. When the grout is mixed with 1.0% of accelerator, the mixture will react when it comes in contact with moisture. Take into consideration the expansion factor of the chemical grout with lower pressure pumping into the joint to be filled.

D. ACCELERATOR

This shall be based on tertiary amines, and be able to control the reaction time from one (1) minute to thirty (30) minutes depending on the amount of accelerator and the temperature of the grout.

E. Deliver, store, and handle all materials in strict accordance with manufacturer's instructions.

**PART 3 – EXECUTION**

**3.01 PREPARATION**

- A. Rout and clean existing slab expansion joints to profile shape shown on the Drawings. Provide joint concrete nosing repairs where required as shown on the Drawings.

**3.02 GROUT SEALS FOR CRACKS AND JOINTS**

- A. Saturated oakum in DE NEEF Hydro Active Flex LV followed by submerging in water. Immediately place saturated oakum in the bottom of the prepared joint and allow to cure 40 minutes.
- B. Place closed cell backer rod in the top of the joint. Set top of backer rod approximately 3/8" below the slab surface.
- C. Insert ¼" inch injection needles through the upper backer rod seal.

**3.03 CHEMICAL GROUT**

A. STORAGE

Store all chemical grouting materials shall be stored in a secured, dry, weather-tight structure. All basic chemical grout shall be furnished in containers acceptable for use in the work. A sufficient quantity of basic chemical grout and other components shall be stored at or near the site of the work to insure that grouting operations will not be delayed by shortages.

**B. MIXING AND HANDLING**

Mixing and handling of the chemical grout and the accelerator shall be in accordance with the recommendations of the manufacturer and all applicable safety codes and shall be performed in such a manner as to minimize hazard to personnel. It is the responsibility of the contractor to provide appropriate protective measures to ensure that the chemical or foam produced by said chemical are under control of the contractor at all times. Plastic or metal mixing tanks shall be used. Tanks of concrete or wood should not be used.

**C. INSTALLATION**

1. For concrete Cracks and Joints.
  - a. Provide saturated surface dry (SSD) condition on the exposed concrete sides in the joint immediately prior to grouting.
  - b. Pump De Neef Hydro Active Flex LV accelerated with 1 percent Flex Cat under low pressure taking into account the expansion of 3 to 5 times for the grout.
2. For embedded metal electrical conduit.
  - a. Remove light pole on level 4 and canopy light on level 3.
  - b. Remove all existing conductors from conduit.
  - c. Clean conduit to remove mineral deposit and dirt.
  - d. Plug conduit at a low point in conduit system.
  - e. Install injection ports and/or zerk fittings.
  - f. Mix CFL PRe resin and Flex Cat PRe accelerator to account for the rapid expansion of 15 times for the grout.
  - g. Inject resin and allow to cure.
  - h. Use injection needles and accelerator mixing to insure a minimum 8 inch length of fill inside conduit.

**END OF SECTION**

## **PART 1 – GENERAL**

### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Surface applied concrete steel reinforcement corrosion inhibitor:

### **1.01 RELATED SECTIONS**

- A. Section 03 01 30 – Surface Preparation for Overlay.
- B. Section 03 01 30.71 – Concrete Rehabilitation.
- C. Section 03 01 40 – Concrete Cleaning and Surface Preparation for Liquid Applied Treatment.
- D. Section 03 30 00 – Cast-in-Place Concrete.

### **1.02 SUBMITTALS**

- A. Comply with Section 01 33 00, unless otherwise indicated. Substitution requests must be submitted 14 day prior to bid date.
- B. Product Data: Manufacturer's specifications and technical data including the following:
  - 1. Detailed specification of construction and fabrication.
  - 2. Manufacturer's installation instructions.
  - 3. Certified test reports indicating compliance with performance requirements specified herein
  - 4. Corporate Letter of compliance to section
- C. Quality Control Submittals:
  - 1. Statement of qualifications.
  - 2. Statement of compliance with Regulatory Requirements.
  - 3. Field Quality Control Submittals as specified in Part 3.
  - 4. Manufacturer's field reports.

### **1.03 QUALITY ASSURANCE**

- A. Manufacturer's Qualification: Not less than 5 years experience in the actual production of specified products, plus the following:
  - 1. Manufacturing facility has achieved ISO 9001 Quality and ISO 14001 Environmental certifications.
- B. Installer's Qualifications: Firm experienced in installation or application of systems similar in complexity to those required for this Project, plus the following:
  - 1. Acceptable to or licensed by manufacturer.
  - 2. Not less than 3 years experience with systems.
  - 3. Successfully completed not less than 5 comparable scale projects using this system.

C. Product Performance Qualifications:

1. Surface Appearance - No change in the surface appearance or texture.
2. Will not leave a residue on nonporous surfaces (i.e.: windows, aluminum framing, etc...)
3. Color: Slightly amber (fugitive dye to be added)
4. Density: 7.3 to 7.4 lbs/gallon
5. Nitrite content: less than 1%
6. Chloride content: less than 20 ppm
7. Material must reduce total corrosion of heavily corroding concrete rebar by an average of 90%, at an internal concrete relative humidity of 75% or greater.
8. Must reduce corrosion by 90% or greater using FHWA RD-98-153 test protocol on crack slab black bars subjected to 48 weeks of cyclic saltwater ponding.
9. Must increase the resistance of chloride ions using AASHTO T277 "Rapid Determination of the Chloride Permeability of Concrete" by 90% minimum
10. Must reduce corrosion by 80% when the presence of chlorides is over 10 lbs/yd<sup>3</sup> of concrete at the top level of reinforcing steel.

Note: A qualified independent laboratory must perform all corrosion and chloride testing.

- D. Regulatory Requirements: Products shall comply with State and local regulations concerning AIM (Architectural, Industrial and Maintenance) coatings regarding Volatile Organic Content (VOC).

**1.04 DELIVERY STORAGE AND HANDLING**

- A. Packing and Shipping: Deliver products in original unopened packaging with legible manufacturer's identification.
- B. Storage and Protection: Comply with manufacturer's recommendations.

**1.05 PROJECT CONDITIONS**

- A. Environmental Requirements:
1. Maintain ambient temperature above 20 degrees F during and 24 hours after installation.
  2. Do not proceed with application on materials if ice or frost is covering the substrate.
  3. Do not proceed with application if ambient temperature of surface exceeds 100 degree F.
  4. Do not proceed with the application of materials in rainy conditions or if heavy rain is anticipated with 4 hours after application.

**PART 2 – PRODUCTS**

**2.01 MATERIALS**

- A. Inhibitor shall be ready-to-use, non-water-borne, surface applied product manufactured in an ISO 9002 certified facility, meeting or exceeding the physical and performance characteristics of the following approved product:
1. Protectosil® CIT  
Evonik Corporation: 299 Jefferson RD; Parsippany NJ 07054; 800-282-091

2. Others as they provide a Corporate Letter stating that they comply with all the requirements of Section 1.03 C. Product Performance Qualifications.

### **PART 3 – EXECUTION**

#### **3.01 EXAMINATION**

- A. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper or timely completion.
  1. Do not proceed until unsatisfactory conditions have been corrected.

#### **3.02 PREPARATION**

- A. Protection:
  1. Unless inhibitor does not affect adhesion of sealants, paints and patching materials all adjacent surfaces shall be protected as necessary in accordance with the manufacturer's recommendations.
  2. Follow the manufacturer's recommendations regarding condition of concrete surfaces before, during and after application.
- B. Surface Preparation:
  1. Remove all paint coatings and line striping from concrete slab surface in application area(s).
  2. All caulking, joint sealants, repairing, and patching of concrete surfaces shall be installed and cured before application of inhibitor. Apply corrosion inhibitor to all newly routed cracks prior to application of sealant. Confirm with Inhibitor Manufacturer compatibility of materials.
  3. Prior to application of corrosion inhibitor, concrete surfaces shall be dry and cleaned of all dust, dirt, debris, grease, oil, grout, mortar, and other foreign matter. Concrete patches and all existing surfaces shall be prepared as recommended by the corrosion inhibitor manufacturer and acceptable to the Engineer.
  4. Shotblast surface to a CSP 3 (min.) surface profile.

#### **3.03 FIELD QUALITY CONTROL**

- A. Test Applications: Before application of inhibitor will be accepted, a test panel will be applied to the concrete to verify performance under the warranty provisions.

#### **3.04 APPLICATION**

- A. Product shall be applied as supplied by the manufacturer without dilution or alteration.
- B. Corrosion inhibitor shall be applied in accordance with the use of either spray, brush, or roller as per manufacturer's recommendations. Corrosion inhibitor shall be applied at a net coverage rate of 75 to 100 ft<sup>2</sup>/gallon in two equal coats with a minimum one hour dry time between coats.
- E. Follow manufacturer's recommendations concerning protection of glass, metal and other non-porous substrates. Contractor will be responsible to clean all surfaces that are contaminated by the corrosion inhibitor.

- F. Follow manufacturer's recommendation concerning protection of plants, grass and other vegetation. Contractor will be responsible for replacing all plants, grass or vegetation damaged by the corrosion inhibitor.

### **3.05 CLEANING**

- A. While Work Progresses: Clean spillage and overspray from adjacent surfaces using materials and methods as recommended by water repellent manufacturer.
- B. Remove and dispose of all materials used to protect surrounding areas and nonmasonry surfaces, following completion of the work of this section.
- C. Clean site of all unused water repellents, residues, rinse water, wastes, and effluents in accordance with environmental regulations.
- D. Repair, restore, or replace to the satisfaction of the Architect, all materials, landscaping, and non-treated surfaces damaged by exposure to corrosion inhibitor.

### **3.06 COMPLETION**

- A. Work that does not conform to specified requirements shall be corrected and/or replaced as directed by the Owners Representative at contractor's expense without extension of time.

**END OF SECTION**

## PART 1 – GENERAL

### 1.01 SUMMARY

- A. Section Includes:
  - 1. Non-structural, non-load bearing metal framing systems as indicated.
  - 2. Blocking for surface mounted equipment.
- B. Related Sections:
  - 1. Section 06 10 00 Rough Carpentry

### 1.02 DEFINITIONS

- A. Conform with requirements of the following Specifications, except as modified and supplemented herein.
  - 1. North American Specification for the Design of Cold-Formed Steel Structural Members (2001 Edition), American Iron and Steel Institute.
  - 2. AISI “Standard for Cold Formed Steel Framing - General Provisions”
  - 3. Cold-Formed Steel Design Manual, American Iron and Steel Institute.
  - 4. AWS D1.3 “Structural Welding Code – Sheet Steel”
- B. Manufacturer's published specifications and installation instructions shall apply where more stringent than the requirements described herein or on the drawings.

### 1.03 SUBMITTALS

- A. Make submittals in accordance with Section 01 33 10 - Submittals.
- B. Shop Drawings: Submit for approval; show materials, sizes, thicknesses, welds, type and location of mechanical fasteners, and accessories or items required of other work for complete installation.
- C. Submit manufacturer's instructions for securing studs to tracks and for other framing connections.
- D. Product Data: Submit manufacturer's published literature for specified products and accessories as applicable, including manufacturer's specifications, physical characteristics, and performance data. Submit as a supplement, manufacturer's instructions and directions for application if not included in manufacturer's published literature.

## PART 2 – PRODUCTS

### 2.01 MANUFACTURER & TYPE

- A. US Gypsum, Steeler, or approved equal; channel type structural framing.

### 2.02 MATERIALS

- A. Studs: Formed of galvanized steel conforming to ASTM A653 (ASTM A36 at 8 and 10 gage), coating weight G-60; size and thicknesses as indicated. Provide with factory cut-outs for wiring and plumbing as necessary, unless noted otherwise on plans. Where "light gauge" called for (non-structural, non-load bearing), use 25-gauge minimum unless stronger material required.
- B. Track, Bridging and Accessories: Formed of galvanized steel conforming to ASTM A653, coating weight G-60.
- C. Fasteners: Self-drilling, self-tapping steel screws; types and sizes as indicated.
- D. Blocking: 16-gauge galvanized steel channel sections by stud sizes indicated. Wood blocking and bracing is specified elsewhere. Provide metal blocking and bracing in framed partitions as required for rigidity and stability including wall stops for doors and other surface mounted items.
- E. Hot Dip Galvanized: All framing members within exterior insulated walls or adjacent to shower rooms or other wet areas shall be hot dip galvanized.

## 2.03 FABRICATION

- A. Fabricate assemblies of sizes and profiles required, with joints fitted, and secured, reinforced, and braced to suit design requirements.
- B. Fit and assemble in largest practical sections for delivery to site and installation.
- C. Cut right angle connections to framing components to fit squarely against abutting members. Torch cutting of load bearing members shall not be permitted.
- D. Fastening of components shall be with self-drilling screws or welding. Screws shall be of sufficient size to insure the strength of the connection. Wire tying of components shall not be permitted. All welds shall be touched up with zinc-rich paint.
- E. Insulation equal to that specified elsewhere shall be provided in all doubled jamb studs and doubled headers not accessible to insulation contractors.

## PART 3 – EXECUTION

### 3.01 INSTALLATION

- A. Align floor and ceiling tracks, locating to wall layout. Secure in place.
- B. Place studs at 16" o.c., unless otherwise indicated, and not more than 2" from abutting walls and at each side of openings. Position ends against the inside runner of web prior to fastening. Connect studs to tracks using welding or self-drilling screws.

- C. Place joists at 16" o.c., unless otherwise indicated. Terminate joists in C-closure sections, and weld or screw connect to channel over studs below. Joists to align with studs, unless noted otherwise on plans.
- D. Construct corners using minimum 3 studs. Double studs at door jambs. Install intermediate studs above and below openings to match wall stud spacing.
- E. Attach cross studs or furring channels to studs for attachment of wall-hung equipment, accessories and other items anchored to partitions or walls.
- F. Install framing between studs and joists for attachment of electrical boxes and other mechanical and electrical items.
- G. Install bracing straps per manufacturer's recommendations.
- H. Provide horizontal stiffeners in stud system, spaced at 48" o.c. maximum (vertical dimension). Weld or screw attach at each intersection.
- I. Erect load bearing studs and joists one-piece full length. Splicing and wire tying of framing components is not permitted.
- J. Erect load bearing studs and joists, brace, and reinforce to develop full strength to meet design requirements.
- K. Make provision for erection stresses. Provide temporary alignment and bracing. Touch-up field welds and scratched or damaged galvanizing.
- L. Ensure framing provides true and flat surfaces, ready to receive finishing materials.
- M. Install framing and bracing consistent with approved, fire-rated systems where required for rated walls.

END OF SECTION

## PART 1 – GENERAL

### 1.01 SUMMARY

- A. Section Includes:
1. Aluminum decorative railings.

### 1.02 COORDINATION AND SCHEDULING

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible.
- B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver items to Project site in time for installation.

### 1.03 ACTION SUBMITTALS

- A. Product Data:
1. Manufacturer's product lines of decorative metal railings assembled from standard components.
  2. Fasteners.
  3. Post-installed anchors.
  4. Handrail brackets.
  5. Shop primer.
  6. Intermediate coats and topcoats.
  7. Nonshrink, nonmetallic grout.
  8. Anchoring cement.
  9. Metal finishes.
- B. Shop Drawings: Include plans, elevations, sections, and attachment details.
- C. Samples for Verification: For each type of exposed finish required.
1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters
  2. Fittings, end caps, and brackets.
  3. Welded connections.
  4. Brazed connections.
  5. Assembled Sample of railing system, made from full-size components, including top rail, post, and handrail. Sample need not be full height.
    - a. Show method of connecting and finishing members at intersections.

### 1.04 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

- B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- C. Product Test Reports: For tests on railings performed by a qualified testing agency, in accordance with ASTM E894 and ASTM E935.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces of railings from damage by applying a strippable, temporary protective covering before shipping.

#### 1.06 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
  - 1. Promenaid.com, [customerservice@promenaid.com](mailto:customerservice@promenaid.com), 1-888-992-4943
  - 2. Or approved equal.

#### 2.02 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design railings, including attachment to building construction.
- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Handrails and Top Rails of Guards:
    - a. Uniform load of 125 lbf/ft. (1.52 kN/m) applied in any direction.
    - b. Concentrated load of 500 lbf (2.22 kN) applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  - 2. Infill of Guards:
    - a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
    - b. Infill load and other loads need not be assumed to act concurrently.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior railings by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
  - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

## 2.02 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.

## 2.03 ALUMINUM DECORATIVE RAILINGS

- A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide Promenaid Channelgrip and Schedule 40 Sprocketlock handrails or comparable product by one of the following:
  - 1. Hollaender Mfg. Co.
  - 2. Inpro Architectural Products.
  - 3. R & B Wagner, Inc.
- B. Source Limitations: Obtain aluminum decorative railing components from single source from single manufacturer.
- C. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.
- D. Extruded Bars and Shapes, Including Extruded Tubing: ASTM B221 (ASTM B221M), Alloy 6063-T5.
- E. Extruded Structural Round Tubing: ASTM B429/B429M, Alloy 6063-T6.
  - 1. Provide Standard Weight (Schedule 40) pipe unless otherwise indicated.
- F. Die Castings: ASTM AG40A (UNS Z33520), aluminum-zinc Alloy 3.

## 2.04 FASTENERS

- A. Fastener Materials:
  - 1. Aluminum Railing Components: Type 316 stainless steel fasteners.
  - 2. Finish exposed fasteners to match appearance, including color and texture, of railings.
- B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction.
- C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless exposed fasteners are unavoidable.
  - 1. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

- D. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, in accordance with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193.
  - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

## 2.05 MISCELLANEOUS MATERIALS

- A. L-Shape Handrail Brackets: Two-piece interlocking die-cast zinc, center of handrail 2-1/2 inches (63.5 mm) from wall with interlocking top flange that conceals anchorage in handrail channel.
- B. T-Shape Handrail Brackets: Two-piece interlocking die-cast zinc, center of handrail 2-1/2 inches (63.5 mm) from mounting surface with interlocking top flange that conceals anchorage in handrail channel, allowing up to 5-degree sloped installation.
- C. Handrail Collars: Two-piece interlocking die-cast zinc, 1.65-inch (42-mm) diameter by 1-inch (25.4-mm) straight collar for connecting handrails or bends with concealed sprocket connector.
- D. Fixed Bends: Two-piece interlocking die-cast zinc, 1.65-inch (42-mm) diameter modular bends for forming required angles and bends between railing sections. Provide combinations of bends as indicated on Drawings to achieve continuous handrails. Provide in 5-, 14-, 32-, and 90-degree increments.
- E. Compound Adjustable Bends: One-piece die-cast zinc, 1.65-inch (42-mm) diameter with adjustable segments for forming continuous handrail around wall surface irregularities from 1 to 4 inches (25.4 to 101.6 mm).
- F. Domed Disks Terminations: One-piece die-cast zinc, 1.65-inch (42-mm) diameter domed disks for terminating railings or bends with concealed sprocket or handrail profile connectors.
- G. 90-Degree Bend Terminations: One-piece die-cast zinc, 1.65-inch (42-mm) diameter 90-degree bend with domed termination short of wall for terminating railings with concealed handrail profile connectors.
- H. Spacers: Two-piece interlocking die-cast zinc, 1.65-inch (42-mm) diameter by 1/2-inch (12.7-mm) stackable spacer for extending handrails, bends, terminations, and brackets with concealed sprocket connector.
- I. Connectors: One-piece die-cast zinc concealed insert with double-sided sprocket connector or channel profile and sprocket connection allowing modular construction of handrails, bends, terminations, and brackets.
- J. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for metal alloy welded.

1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- K. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
  1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- L. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- M. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
  1. Water-Resistant Product: At all locations, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

## 2.06 FABRICATION

- A. Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage.
- B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.
  1. Clearly mark units for reassembly and coordinated installation.
  2. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately.
  1. Remove burrs and ease edges to a radius of approximately **1/32 inch (1 mm)** unless otherwise indicated.
  2. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that will be exposed to weather in a manner to exclude water.
  1. Provide weep holes where water may accumulate.
  2. Locate weep holes in inconspicuous locations.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded or mechanical connections unless otherwise indicated.

- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove flux immediately.
  - 4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 welds; ornamental quality with no evidence of a welded joint.
  
- I. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
  
- J. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings.
  - 1. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
  - 2. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
  
- K. Form changes in direction as follows:
  - 1. By inserting prefabricated elbow fittings.
  - 2. By inserting prefabricated flush-elbow fittings.
  - 3. By inserting prefabricated elbow fittings of radius indicated.
  - 4. By bending to smallest radius that will not result in distortion of railing member.
  
- L. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
  
- M. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.
  
- N. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
  
- O. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, handrail brackets, miscellaneous fittings, and anchors to interconnect railing members to other Work unless otherwise indicated.
  - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and to prevent bracket or fitting rotation and crushing of substrate.
  
- P. Provide inserts and other anchorage devices for connecting railings to concrete or masonry Work.
  - 1. Fabricate anchorage devices capable of withstanding loads imposed by railings.
  - 2. Coordinate anchorage devices with supporting structure.

- Q. For railing posts set in concrete, provide stainless steel sleeves not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (13 mm) greater than outside dimensions of post, with metal plate forming bottom closure.
- R. For removable railing posts, fabricate slip-fit sockets from stainless steel tube or pipe whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height.
  - 1. Provide socket covers designed and fabricated to resist being dislodged.

## 2.07 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

## 2.08 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
- B. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
  - 1. Color: Satin black.
- C. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
  - 1. Color and Gloss: Satin black.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

### 3.02 INSTALLATION, GENERAL

- A. Perform cutting, drilling, and fitting required for installing railings.

1. Fit exposed connections together to form tight, hairline joints.
  2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
  3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
  4. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  5. Set posts plumb within a tolerance of 1/16 inch in 3 ft. (2 mm in 1 m).
  6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 ft. (6 mm in 3 m).
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- C. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

### 3.03 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws, using plastic cement filler colored to match finish of railings.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article, whether welding is performed in the shop or in the field.
- C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve, extending 2 inches (50 mm) beyond joint on either side; fasten internal sleeve securely to one side; and locate joint within 6 inches (150 mm) of post.

### 3.04 ANCHORING POSTS

- A. Use stainless steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Form or core-drill holes not less than 5 inches (125 mm) deep and 3/4 inch (20 mm) larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or

anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

- C. Cover anchorage joint with flange of same metal as post, attached to post with set screws.
- D. Leave anchorage joint exposed with anchoring material flush with adjacent surface.
- E. Anchor posts to metal surfaces with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
  - 1. For aluminum railings, attach posts as indicated, using fittings designed and engineered for this purpose.
- F. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

### 3.05 ATTACHING RAILINGS

- A. Anchor railing ends to concrete and masonry with sprockets concealed within and [brackets on underside of rails connected to railing ends and anchored to wall construction with anchors and bolts.
- B. Anchor railing ends to metal surfaces with sprockets bolted to metal surfaces and connected to railing ends, using nonwelded connections.
- C. Attach handrails to walls with wall brackets, except where end sprockets are used. Provide brackets with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface.
  - 1. Use type of bracket with sprocket for concealed anchorage.
  - 2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- D. Secure sprockets and wall brackets to building construction as follows:
  - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
  - 2. For hollow masonry anchorage, use toggle bolts.
  - 3. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
  - 4. For steel-framed partitions, use hanger or lag bolts set into fire-retardant-treated wood backing between studs. Coordinate with stud installation to locate backing members.
  - 5. For steel-framed partitions, fasten brackets directly to steel framing or concealed steel reinforcements using self-tapping screws of size and type required to support structural loads.
  - 6. For steel-framed partitions, fasten brackets with toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

### 3.06 REPAIR

- A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - a. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

3.07 CLEANING

- A. Clean aluminum by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.

3.08 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period, so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

**END OF SECTION**

## PART 1 – GENERAL

### 1.01 SECTION INCLUDES

- A. Miscellaneous rough carpentry work including work not specified as part of other sections and which is described below:
  - 1. Structural floor, built-up structural beams and columns; sills, miscellaneous framing and sheathing, and concealed wood blocking.

### 1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to the work of this section.
- B. Section 02 41 19 – Selective Demolition  
Section 08 11 13 – Hollow Metal Doors and Frames

### 1.03 GENERAL NOTES

- A. Dimensions, as contained in these Specifications or as scaled from the Detail Drawings shall be presumed to be approximate. In the event that site conditions uncovered during the work require modification to, or alteration of those dimensions to accomplish the work in accordance with the intent of these Specifications, the Contractor shall make the adjustments as required to comply with that intent.

### 1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Arrange for installation of miscellaneous carpentry by a firm that can demonstrate successful experience in installing carpentry items similar in type and quality to those required for this project.
- B. Conform to requirements of the following Reference Standards or as modified and supplemented within this specification.
  - 1. 2018 International Building Code (IBC)
- C. Conformance with Standards and Tests: Materials and handling shall conform to the following organizations' standards for materials testing and handling. Each standard is hereafter referred to by its organizational designation only. All materials and handling techniques shall conform to the appropriate standard.
  - 1. Lumber Grading Agency: Certified by DOC PS 20.
  - 2. Wood Structural Panel Grading Agency: Certified by EWA – the Engineered Wood Association.
  - 3. Lumber: DOC PS 20.
  - 4. Wood Structural Panels: DOC PS 1 or DOC PS 2.
  - 5. ASTM A 123 - American Society for Testing and Materials Zinc (Hot Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and

Strips.

6. ASTM A 153 - American Society for Testing and Materials Zinc Coating (Hot-Dip) on Iron and Steel Hardware
7. ASTM A 307 - American Society for Testing and Materials Carbon Steel Externally Threaded Standard Fasteners
8. ASTM A 563 - American Society for Testing and Materials Carbon and Alloy Steel Nuts
9. C2 - American Wood Preservers Association Lumber, Timbers, Bridge Ties, and Mine Ties Preservative Treatment by Pressure Process
10. M4 - American Wood Preservers Association Standard for the Care of Pressure Treated Wood Products

1.05 PRODUCT HANDLING

- A. Delivery and Storage: Keep materials dry at all times. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar material stacks. Store in a safe location, out of pedestrian and vehicular traffic and protected from weather. Repair or replace any damaged components before installation. Do not store materials directly in contact with the ground.

1.06 PROJECT CONDITIONS

- A. Environmental Conditions: Obtain and comply with rough carpentry materials manufacturer's and installer's recommendations for optimum temperature and humidity conditions for rough carpentry during its storage and installation.
- B. Coordination: Fit carpentry work to other work; scribe and cope as required for accurate fit.
- C. Safety Requirements: Commencement of the work of this Section implies an absolute commitment to managing the materials used in the execution of the work to avoid loss into the surrounding site. Contamination of the surrounding landscape with loose nails, screws, wood and metal scraps, splinters, and spilled paints or solvents will be avoided by covering adjacent areas with protective tarps or other approved means. Loose materials will be collected on a daily basis to avoid unintentional loss

PART 2 – PRODUCTS

2.01 STANDARDS

- A. Latest Standard Grading Rules for West Coast Lumber, by West Coast Lumber Inspection Bureau (WCLIB) or Western Woods Products Association (WWPA).
- B. National Design Specifications for stress grade lumber and its fastenings, latest

edition.

- C. Plywood: US Product Standard PS 1-83 of Construction and Industrial Plywood.
- D. Preservative Treatment: American Wood Preserver's Association (AWPA) Standard TT-W-571.
- E. APA Engineered Wood Association.
  - 1. ANSI/APA PRP210-08 – Standard for Performance – Rated Engineered Wood Siding.
  - 2. APA PDS-12 – Panel Design Specification.
- F. American Wood-Preservers' Association:
  - 1. AWPA C1 - All Timber Products - Preservative Treatment by Pressure Process.
  - 2. AWPA C20 - Structural Lumber - Fire-Retardant Treatment by Pressure Processes.
- G. ASTM International:
  - 1. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing.
  - 2. ASTM C1396/C1396M - Standard Specification for Gypsum Board.
  - 3. ASTM D5456 - Standard Specification for Evaluation of Structural Composite Lumber Products.
  - 4. ASTM F1667 – Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
- H. U. S Department of Commerce National Institute of Standards and Technology:
  - 1. DOC PS 1 - Construction and Industrial Plywood.
  - 2. DOC PS-2 – Performance Standard for Wood Based Structural-Use Panels.
  - 3. DOC PS 20 - American Softwood Lumber Standard.
- I. West Coast Lumber Inspection Bureau:
  - 1. WCLIB - Standard Grading Rules for West Coast Lumber.
- J. Western Wood Products Association:
  - 1. WWPA G-5 - Western Lumber Grading Rules.

## 2.02 STRUCTURAL WOOD MEMBERS:

- A. All wood used shall be Hem-Fir, Select Structural or better, unincised, Pressure Treated to AWPA Quality Standard C2, retaining a minimum of 0.25 lbs / cf ACQ or CBA preservative.

## 2.03 LUMBER, GENERAL

- A. Nominal sizes are indicated, except as shown by detail dimensions.
- B. Provide dressed lumber S4S, unless otherwise indicated.
- C. Inspection Agencies: Inspection agencies and the abbreviation used to reference them

with lumber grades and species include the following:

1. WCLIB - West Coast Lumber Inspection Bureau
  2. WWPA - Western Wood Products Association
- D. Grade Stamps: Provide lumber with each piece factory-marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
- E. Provide seasoned lumber with 19% maximum moisture content at time of dressing shipment for sizes 2" or less in nominal thickness, unless otherwise indicated.

#### 2.04 DIMENSION LUMBER

- A. For framing, nailers, curbs, and etc.: (2" to 3" thick), #2 and btr. DF-L graded under WCLIB rules.
- B. For framing members 4 x and larger, #1 and BTR, DF-L graded under WCLIB rules.

#### 2.05 FINISHES

- A. Wood Finishes: Following acceptance of all wood construction, an approved water-based commercial sealer shall be applied to the manufacturer's written specifications.
- B. Preservative-Treated Materials: Labeled by an inspection agency approved by ALSC's Board of Review. Materials kiln-dried after treatment, lumber to 19 percent moisture content, and plywood to 15 percent.
1. Standards: For lumber, AWWA C15 as applicable to the specific use or C2 where C15 does not apply; for plywood AWWA C9.
  2. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
    - a. ACZA-treated lumber is not acceptable for foundation sill plates.
    - b. Coordinate preservative-treatment chemical types with corrosion-resistance requirements for metal framing hardware and fasteners specified elsewhere in this section. Provide only preservative-treated materials for which compatible hardware and fasteners are available.
  3. Treat indicated items, items required by codes in effect, and the following:
    - a. Wood members used in connection with roofing, exposed exterior flashing, and waterproofing membranes.
    - b. Concealed members in contact with masonry or concrete.
    - c. Wood framing members less than 18 inches above grade.
    - d. Wood floor plates installed over concrete slabs directly in contact with earth.

#### 2.06 MISCELLANEOUS MATERIALS

- A. Corrosion-resistant metal: Where stainless steel or galvanizing are indicated, comply with the following:
  - 1. Stainless Steel: Type 304.
  - 2. Galvanized Steel:
    - a. Mechanically Galvanized Steel: Use for threaded galvanized fasteners; ASTM B698, coating Class 55 or greater coating weight.
    - b. Hot-Dip Galvanized Steel: Use for all other galvanized fasteners and hardware; ASTM A 153, coating weight as indicated in this Section, or where not otherwise indicated, standard coating weight.
  
- B. Metal Framing Anchors: Of structural capacity, type, and size indicated, material types as follows:
  - 1. In contact with ACQ-C, ACQ-D, CBA-A, or CA-B treatment lumber: HD Galvanized, G-185 coating weight.
  - 2. In contact with ACZA-treated lumber: Stainless steel.
  - 3. In contact with untreated or borate-treated lumber: HD Galvanized, G-60 coating weight.
  - 4. Other preservative treatments not listed above: Comply with recommendations of treatment and framing anchor manufacturers.
  
- C. Fasteners: Size and type indicated. For fasteners of any type to remain exposed in completed work, provide types as accepted by Architect through submittals.
  - 1. Minimum corrosion-resistant materials requirements:
    - a. For fastening metal framing anchors: Use the same material as the framing anchor, i.e., galvanized fasteners for galvanized anchors, and stainless steel fasteners for fastening stainless steel.
    - b. In contact with ACZA-treated lumber: Stainless steel.
    - c. In contact with other lumber materials: HD Galvanized.
  
- D. Specifications for nails, screws, bolts, nuts, washers, and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommended nails. Do not use explosive fasteners into masonry.
  - 1. Bolts, Nuts, Washers shall be galvanized steel, SAE, sized per the Contract Drawings. Bolts, nuts, and washers shall conform to the applicable requirements of specification FF-B-571 and FF-B-575.
  - 2. Wire nails shall be hot-dipped galvanized and conform to specification FF-N-105.
  - 3. Screws (countersunk or bugle head) Philips, stainless steel for all exterior and interior uses.
  - 4. Steel Plate connectors shall be 3 gauge with 7 gauge strap anchors where applicable, galvanized after fabrication, factory primed finish gray, Strong-Tie Connectors as manufactured by Simpson Strong-Tie Company, Inc., (800) 999-5099, or approved equal.
  
- E. Adhesive for Field Gluing Panels to Framing: APA AFG-01. Adhesive for Field Gluing Panels to Framing: APA AFG-01., or approved equal.

### PART 3 – EXECUTION

#### 3.01 EXAMINATION

- A. Prior to commencing the work of this Section, verify existing conditions and report any discrepancies to the owner immediately.
- B. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting installation and performance of finish carpentry. Do not proceed with installation until unsatisfactory conditions have been corrected.

#### 3.02 INSTALLATION, GENERAL

- A. All wood assembly shall comply with construction documents.
- B. Make provisions for erection loads and for sufficient temporary bracing to maintain structure safe, plumb, and in alignment until completion of erection and installation of permanent bracing.
- C. Discard units of material with defects that might impair quality of work, and units that are too small to use in fabricating work with minimum joints or optimum joint arrangement.
- D. Set carpentry work to required levels and lines, with members plumb and true to line and cut and fitted.
- E. Securely attach carpentry work to substrate by anchoring and fastening as shown in construction drawings and as required by recognized standards.
- F. Use common wire nails, except as otherwise indicated. Use finishing nails for finish work. Make tight connections between members. Install fasteners without splitting of wood; pre-drill as required.
- G. Do not use carpentry materials that are unsound, warped, bowed, twisted, improperly finished, not adequately seasoned, or too small to fabricate with proper jointing arrangements.
- H. Install carpentry plumb, level, true, and aligned with adjacent materials. Use concealed shims where required for alignment.
- I. Scribe and cut finish carpentry to fit adjoining work.
- J. Install to tolerance of 1/8 inch in 8 feet for plumb and level. Install adjoining finish carpentry with 1/16-inch maximum offset for flush installation and 1/8-inch maximum offset for reveal installation.

- K. Coordinate finish carpentry with materials and systems that may be in or adjacent to standing and running trim. Provide cutouts for mechanical and electrical items that penetrate exposed surfaces of trim.
- L. Assemble Arbor structures in conformance with the Contract Drawings.
- M. All shop fabricated and field cuts and borings shall be treated with waterborne ACQ or CBA to APWA C2 quality standards.
- N. All vertical supports shall be installed plumb unless otherwise noted. Allow additional height for adjustment of horizontal members in the event that post bases are not installed at exact, equal elevations.
- O. Install all horizontal members to true level unless otherwise specifically noted by an indication of intended slope. Prior to making final connection, trim added height from vertical members to achieve the intent of the drawings.
- P. Mechanical Connections
  - 1. Securely clamp and brace wood members to be connected to establish precise location and true level in bolt holes and lag screw pilot holes. Protect surfaces of permanent wood members from compression damage with scrap 1"x material. Do not use temporary nailing.
  - 2. Machine or Carriage Bolt connections shall be pre-drilled to 1/16" larger diameter than the specified connector.
  - 3. Lag Screw connections shall be pre-drilled to ¼" minimum under size of specified connector.
  - 4. Make countersink borings to accept washers ¼" over diameter of specified washer and depth to allow bolt or screw head to tighten to between flush and ¼" beneath lumber surface. Do not allow bolt heads or ends to protrude beyond wood surface, and do not reduce the thickness of the structural connection by over-boring.
  - 5. Make all connections tight without overly distorting or compressing wood surfaces or countersink borings.
  - 6. Wood-to-Steel connections shall be separated by standard, medium weight roofing felt. Trim excess as directed.
- Q. Screw Connections
  - 1. Pre-drill all screwed connections to a 3/32" diameter pilot hole with an integral counter-sink bit.
  - 2. Apply standard wood glue to pilot holes prior to making connection.
  - 3. Counter-sink simple screwed connections so that screw-head is 1/8" to ¼" below surface.
  - 4. Fill all counter-sunk screw holes with weatherproof filler.
- R. Mechanical Connections
  - 1. Securely clamp and brace wood members to be connected to establish precise location and true level in bolt holes and lag screw pilot holes. Protect surfaces of permanent

wood members from compression damage with scrap 1"x material. Do not use temporary nailing.

2. Machine or Carriage Bolt connections shall be pre-drilled to 1/16" larger diameter than the specified connector.
  3. Lag Screw connections shall be pre-drilled to ¼" minimum under size of specified connector.
  4. Make countersink borings to accept washers ¼" over diameter of specified washer and depth to allow bolt or screw head to tighten to between flush and ¼" beneath lumber surface. Do not allow bolt heads or ends to protrude beyond wood surface, and do not reduce the thickness of the structural connection by over-boring.
  5. Make all connections tight without overly distorting or compressing wood surfaces or countersink borings.
  6. Wood-to-Steel connections shall be separated by standard, medium weight roofing felt. Trim excess as directed.
- S. Screw Connections
1. Pre-drill all screwed connections to a 3/32" diameter pilot hole with an integral counter-sink bit.
  2. Apply standard wood glue to pilot holes prior to making connection.
  3. Counter-sink simple screwed connections so that screw-head is 1/8" to ¼" below surface.
  4. Fill all counter-sunk screw holes with weatherproof filler.

### 3.03 FINISHES

- A. Moisture Testing on Exterior Wood Surfaces: Prior to painting, moisture reading shall be taken with an approved professional grade moisture meter. This reading shall not exceed 19%. If environmental conditions are not favorable and wood tested regularly over a period of days does not show a drying trend, finishing operations may, at the discretion of the architect, be suspended until such time as conditions become appropriate.
- B. Following acceptance of moisture testing, apply sealer to approved manufacturers specifications.
- C. All fabricated steel components shall arrive at the work site pre-galvanized and pre-primed. Following installation the architect may direct additional field galvanization or priming as necessary to correct damage that may have occurred during installation. Following acceptance of the prepared surface, apply 2 coats of approved Alkyd Enamel, following manufacturer's written specification for cure time between coats.
- D. Immediately clean all surfaces that receive incidental and/or unspecified finishes.

### 3.04 CLEAN UP

- A. Remove all construction debris including loose nails, screws, sawdust, wood and metal

scraps, splinters, and spilled paints or solvents from all adjacent and surrounding surfaces and landscape areas. Use magnets or metal detectors to verify for the owner that no loose nails or screws remain in surrounding soils.

3.05 ACCEPTANCE

- A. Upon completion of the fabrication, assembly and finish work, and cleanup, the owner may require spot-tightening of various connection hardware. During the scheduled final inspection, insure that all of the tools and equipment necessary for this task are on hand. Following this final adjustment the owner will consider the work complete.

END OF SECTION

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

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

### 1.02 SUMMARY

- A. This Section includes but is not limited to the installation of a reinforced (2-ply) cold fluid-applied polymer modified waterproofing with all the materials, labor and supervision necessary to provide a continuous waterproofing system below grade.
- B. Related Sections:
  - 1. Section 03 30 00 – Cast In Place Concrete
  - 2. Section 07 92 00 – Joint Sealants

### 1.03 REFERENCE STANDARDS

- A. ASTM International (ASTM): [www.astm.org](http://www.astm.org):
  - 1. ASTM C836 – Standard Test Methods for Crack Cycling
  - 2. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension
  - 3. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
  - 4. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
  - 5. ASTM D3767 - Standard Practice for Rubber—Measurement of Dimensions
  - 6. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous
  - 7. ASTM D4833 - Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products
  - 8. ASTM D5385/5385M - Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
  - 9. ASTM E96/E 96M - Standard Test Methods for Water Vapor Transmission of Materials
  - 10. ASTM D4068 - Standard Specification for Chlorinated Polyethylene (CPE) Sheeting for Concealed Water-Containment Membrane
  - 11. ASTM D5385 - Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
  - 12. ASTM D570 - Standard Test Method for Water Absorption of Plastic
  - 13. U. S. Environmental Protection Agency (EPA): [www.epa.gov](http://www.epa.gov).

### 1.04 SUBMITTALS

- A. Product Data: Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
- C. Samples: For each exposed product and for each color and texture specified, including the following products:
  - 1. 8-by-8-inch (200-by-200-mm) square of waterproofing and flashing sheet.
  - 2. 4-by-4-inch (100-by-100-mm) square of drainage panel.
- D. Product test reports shall yield the following results:
  - 1. Liquid Adhesive applied at the rate of two gallons per square (100 sq. ft.) yields the following test results.
    - a. ASTM D-529-82, Weathering Daily Cycle B. No cracking or crazing. No slump. Turns a slight gray color.
    - b. Hardness: Attains a Shore Hardness of 60 max.
    - c. Ductility; ASTM D-113-79; at 1 cm per minute (39.2oF=4oC) 125% elongation min.
    - d. Wind up-lift pull=150 lbs. using test apparatus.
    - e. Water permeability; ASTM E-96-80; 0.005 perms/hr./sq. ft. f. Dry Film Thickness: 9 mils per gallon per 100 sq. ft. min.

#### 1.05 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer, approved by manufacturer to install manufacturer's products. Installer is responsible for inspecting project for all relevant field conditions prior to installation. Conditions noted by installer are to be corrected prior to installation of the waterproofing system. Commencement of installation indicates acceptance of substrate conditions by the contractor.
  - 1. Installer shall have not less than 5 waterproofing projects similar to requirements for this Project with satisfactory in-service, leak-free performance.
- B. Pre installation Conference: Conduct conference at Project site. Minimum of 2 weeks prior to starting Work of this Section.
  - 1. Preinstallation conference shall include but not be limited to the following attendees.
    - a. Owner
    - b. Architect/ Engineer/ Consultant
    - c. Waterproofing contractor
    - d. Manufacturer's authorized technical representative
    - e. General contractor and subcontractors having impact on the waterproofing system.
  - 2. Review waterproofing submittal status, waterproofing requirements including surface preparation, substrate condition and pretreatment, Manufacturer approval of substrate,

minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, safe, adequate temporary protection to be erected to allow concrete to surface dry and waterproofing work to proceed on dry substrates despite inclement weather, dewatering and associated pumping and storing of water to facilitate successful waterproofing application, testing and inspection procedures, and protection and repairs, material deliveries and site storage installation monitoring, correction of noted deficiencies, overnight and weekend seals, well-secured tenting and temporary protection requirements if applicable

#### 1.06 FIELD CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
  - 1. Do not apply waterproofing in snow, ice, rain, fog, morning dew, or mist.
  - 2. Do not apply waterproofing or related drainage mat materials during precipitation.
  - 3. Do not apply waterproofing where groundwater is present until all water has been fully removed from areas to receive waterproofing and substrate is dry and prepared
- B. Maintain adequate ventilation during preparation and application of waterproofing materials.

#### 1.07 DELIVERY, STORAGE AND HANDLING

- A. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by waterproofing manufacturer.
- B. Remove and replace liquid materials that cannot be applied within their stated shelf life. Protect stored materials from direct sunlight.
- C. Boxes containing the Waterproofing Sheet must be stored flat at all times, approximately 5 boxes high, on pallets or other means to keep off the ground.
- D. If indoor or trailer storage is not available, tarp in with canvas tarpaulins only.
- E. DO NOT USE POLYETHYLENE OR OTHER NON-BREATHING FILMS TO COVER THE BOXES.
- F. Remove rolls of Waterproofing Sheet from boxes when ready to use. Do not discard boxes for restoring of any unused or partial rolls.
- G. Store in cool places only. If trailer storage is used, it should be well ventilated for summer storage and 60F (maximum) or winter storage.

#### 1.08 HEALTH AND SAFETY

- A. Safety and Health: Comply with the requirements of State of Washington Department of Labor and Industries (L&I), Washington Industrial Safety and Health Act (WISHA), Division of Occupational Safety and Health (DOSH), Occupational Safety and Health (NIOSH), and all local governing authority for workplace safety.
- B. Protection and General Safety: Protect building interior and exterior and adjacent areas and spaces from precipitation, weather, dust, debris, construction-related scraps, odors, and fumes. Use staged fans to divert fumes, maintain adequate ventilation during application, drying and curing of substrates and to facilitate application and curing of waterproofing materials.
  - 1. Set dumpsters and or daily mobile dump truck with covering or tenting to capture construction debris, material wrappers and avoid air-born dust and debris, and provide other implements and provisions, as required to assure the health and safety inside and outside the building and surrounding environment, including protecting Owner(s), Staff(s), Public, parking lots, workers, work areas, driveways, and associated grounds during the Project.
- C. Protection from falling material, equipment and debris, shall be exercised at hoisting points to protect, Owner(s), staff, public, workers and personnel, building, structure, adjacent walls, fenestration, decks, hardscape, and landscape.
  - 1. Route for removal of existing demolition materials and delivery of new materials shall be through the route designated and agreed during the Pre-Construction Meeting.

#### 1.09 SCHEDULING

- A. Schedule work so waterproofing applications may be inspected prior to concealment.

#### 1.10 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard form, signed by manufacturer and installer, and agreeing to repair or replace waterproofing that does not comply with requirements or that does not remain watertight after date of Substantial Completion.
  - 1. Warranty Period: Five (5) years from date of Substantial Completion.
- B. Installer's Special Warranty: Specified form, signed by Installer, covering Work of this Section, for warranty period of five (5) years.
  - 1. Warranty includes removing and reinstalling protection board and drainage panels,

### PART 2 – PRODUCTS

#### 2.01 MATERIALS, GENERAL

- A. Source Limitations: Provide waterproofing system materials and accessory products from a single-source system manufacturer.

## 2.02 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
- B. Products: Subject to compliance with requirements, provide one of the following:
  - 1. Single-Component, reinforced cold fluid applied rubber modified asphalt waterproofing:
    - a. Laureco Waterproofing System, as manufactured by FBC Chemical Corp.

## 2.03 WATERPROOFING MATERIALS

- A. Waterproofing:
  - 1. Cold Fluid-Applied Waterproofing: Comply with ASTM C 836
  - 2. Or approved equal
- B. Adhesive: Specially formulated Asphalt modified with compatible polymers using long fibers and clean aliphatic solvent.
  - 1. Compatible polymers are combinations of Neoprene, Butyl and/or N.B.R.
  - 2. Solid Content 55% min.
  - 3. Meets or exceeds ASTM D-2823, Type 1 and Federal Specification SS-A-694D.
  - 4. Using ASTM Test Method D-1004-70, Tensile Strength shall be 1070 p.s.i. average; using Tear Die C 77lbs. per inch average of sheets and adhesive.
- C. Sheet Flashing and Reinforcing Sheet: 50-mil-(1.3 mm) minimum, proprietary chloroprene rubber.
  - 1. Specially formulated Asphalt modified with Chloroprene Rubber (Neoprene\*) plus appropriate fillers, curing agents and plasticizer.
  - 2. Thickness of waterproofing sheet is 50 mils. plus or minus 5%.
  - 3. Tensile strength of waterproofing sheet = 75 lbf/in. Min. (ASTM D 146-90, section 13) and (ASTM E 154-99, section 9). Two Ply Waterproofing System > 180 lbf/in.
  - 4. Puncture resistance of waterproofing sheet = 215 lbs. (ASTM E 154-99, section 10). Two Ply Waterproofing System > 450 lbs.
  - 5. Ductility of Modified Asphalt for use on waterproofing sheet: (ASTM D-113-69) at 39.2 degree F. using 1cm. per min. pull-10% to 12.5% plus, at 75 degree F. using 5 cm. per min. pull = 100% to 125% plus.
  - 6. Softening point of modified asphalt used on waterproofing sheet: (ASTM D 36-70 using distilled water) = 160° degree F. min.
  - 7. Penetration of Modified Asphalt used on waterproofing sheet: (ASTM D 5-73) = 30 max. at 77 degree F. using 3 oz. seamless metal container.
  - 8. Ductility of Sheet: 1.360 degree bend on 1" O.D. bar at 39.2° degree F. at 5cm. per min. flex. Minimum. Mesh or polyester fabric.
- D. Performance Criteria or Sheet and Adhesive:

1. Water Permeability-Inverted cup @ 75° degrees F. 25 day duration (ASTM. E96-95 Procedure BW) using Manufacturer's sheet and adhesive in System form 0.005 grams/hr./sq. ft.
  2. Weather test on waterproofing sheet and adhesive in System form (ASTM Test Method D 529-73, Daily Cycle B) 25 days. Hardness range of 60 plus or minus 5 pt. variation of a range of 0-99 Shore A hardness and no further changes after 10 cycles-Materials stable with no cracking or crazing. Cycles continued for 25 days.
  3. Pull Test: Using 1" thick concrete slab and waterproofing system (2 plies Sheet and Adhesive) pull at rate of 2 inches per minimum. Results = 26.39 lbs. plus p.s.i. or 3800 lbs. plus per minimum. (slabs all broke under pull test-1" thick were used to accommodate machine) See Tensile Strength.
  4. Waterhead Test: Results incomplete as 210 foot limit of machine was reached at end of 28 days with no leakage.
  5. Mullen Burst Test: (Membrane Sheets and Adhesive) shall attain 160 p.s.i. minimum.
- E. Protection Course:
1. Smooth surfaced, premium polymer modified reinforced asphaltic protection sheet complying with ASTM D5147 with minimum thickness of 94 or 120 mils.
    - a. Laureco SPC
    - b. Laureco PPC
  2. Unfaced extruded polystyrene board insulation; ASTM C 578, Type X, 1 inch thick minimum. (Vertical application only)
- F. Molded-Sheet Drainage Panels
1. Composite drainage panels, 3 dimensional, non-biodegradable, manufactured with a permeable geotextile bonded to molded plastic-sheet drainage core and designed to effectively convey water.
  2. Geotextile: Nonwoven geotextile fabric of polypropylene or polyester fibers or combination of both.
  3. Film Backing Plastic: Plastic, protective film backing sheet attached to surface facing waterproofing.
  4. Compressive Strength core: 15,000 psf when tested according to ASTM D 1621 for use on pedestrian areas.
  5. Compressive Strength core and root inhibitor: 15,000 psf when tested according to ASTM D 1621 for use in planter areas.
  6. Compressive Strength core: 30,000 psf when tested according to ASTM D 1621 for use on vehicular traffic areas.
  7. Available Products: Subject to compliance with requirements, products that may be incorporated into the work include but are not limited to:
    - a. Waterproofing Manufacturer's proprietary drainage panel
    - b. Waterproofing Manufacturer Approved drainage panel.
- G. Root Barrier

1. High density polyethylene sheet manufactured for use as a mechanical barrier and root deflector to prevent tree roots from damaging waterproofing of planters and installed directly over protection board.
2. Available products: Subject to compliance with requirements, products that may be incorporated into the work include but are not limited to;
  - a. Waterproofing manufacturers proprietary root barrier.
  - b. Waterproofing manufacturers Approved root barrier.

#### 2.04 INSULATION BOARD (where required)

- A. Extruded Polystyrene:
  1. Minimum 40 psi compressive strength extruded polystyrene (XPS) with integrated drainage channels. (Unless separate drainage mat installed.)
  2. Comply with ASTM C 578

### PART 3 - EXECUTION

#### 3.01 SURFACE PREPARATION

- A. Clean and prepare substrate according to manufacturer's written recommendations. Provide clean, dust-free, and dry substrate for waterproofing application.
  1. Verify that substrate is visibly dry and free of excessive moisture.
- B. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- C. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.
- D. Prepare vertical and horizontal surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, and sleeves according to ASTM C 898 and manufacturer's written instructions.
  1. Apply a double thickness of waterproofing and embed a joint reinforcing strip in preparation coat when recommended by waterproofing manufacturer.
- E. Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 898 and waterproofing manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.
- F. Repair damaged or spalling substrates for roughness with repair mortar patches or one component cementitious parge coatings rated for vertical and overhead use that have early strengths and are resistant to freeze thaw. Provide a finish suitable for waterproofing installation; broom finish minimum.

- G. Install Proprietary LW PMMA liquid flashing and bond to deck and wall substrates where indicated or required according to waterproofing manufacturer's written instructions.
  - 1. Extend sheet flashings onto perpendicular surfaces and other work penetrating substrate according to ASTM C 898.
  
- H. Surface Preparation:
  - 1. Remove or grout projections higher than  $1/16$  inch. i.e., fins
  - 2. Grout all tie-wire hole.
  - 3. Grout all honeycombs and voids larger than a US 25 cent coin and deeper than  $1/4$ " inch.
  - 4. Remove all latencies, spatters, dirt, etc., by scraping surfaces to be waterproofed. Do not grind.
  - 5. Scrape off knife-like edges of exterior corners and grout to a continuous smooth surface all exterior and interior corners. Good wood float finish is preferred; good wood screed is acceptable.
  - 6. Remove all dirt and debris. Use A.C.I. 515, 1R-79, Chapter 3, and A.C.I. 301- 72 (revised 1975), Chapters 9, 10, 11 (11,8,2 Finished Surfaces) as reference information guide. Water cure only if surface cannot be waterproofed immediately. Propane weed burners or hot air torches may be carefully used to surface dry. Surface dry only.

### 3.02 INTERFACE WITH OTHER WORK

- A. Sequencing of Work: Coordinate sequencing of waterproofing installation with work of other sections that form portions of building envelope moisture control to ensure that flashings and transition materials can be properly installed and inspected.
  
- B. Subsequent Work: Coordinate waterproofing installation with work of other sections installed subsequent to waterproofing to ensure complete inspection of installed waterproofing and sealing of waterproofing penetrations necessitated by subsequent work.

### 3.03 WATERPROOFING APPLICATION

- A. GENERAL:
  - 1. Install fully adhered sheets over entire area to receive waterproofing according to manufacturer's written instructions.
  - 2. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps of each ply.
  - 3. Uniformly distribute bonding adhesive. Warning, excessive adhesive will interfere with installation and coring of waterproofing membrane.
  - 4. Roll waterproofing sheet into adhesive. Work sheet into adhesive with wood head squeegee following waterproofing manufacturers written installation instructions.
  - 5. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit, flatten and adhere fishmouths and blisters. Patch with sheet waterproofing extending beyond repaired areas in all directions.

B. FIRST PLY INSTALLATION:

1. Apply adhesive to prepared substrate at rate of 1.5 to 1.75 gallons maximum per 100 square feet. Do not exceed amount of specified adhesive.
  - a. Roll first ply of waterproofing sheets into adhesive after “tack” develops. Use push broom or water filled lawn roller to alleviate trapped air by working air pockets from center outward toward sheet edges.

C. SECOND PLY INSTALLATION:

1. Apply adhesive at rate of 1.0 to 1.25 gallons maximum per 100 square feet. Do not exceed amount of adhesive specified.
2. Install second ply of waterproofing sheets using “cap sheet” application method only. Side and end laps of 1st ply must be offset a minimum of 8 inches.
3. Roll second ply of waterproofing sheets with side laps offset a minimum of 8 inches from first ply of rolls after tack develops.

D. CURING AND SETTING

1. Allow completed waterproofing to cure for 12 to 48 hours prior to water testing or application of protection board.
2. Verify proper curing and setting of waterproofing in accordance with manufacturer's written instructions before proceeding.
3. Where water testing is required, it is recommended to perform testing prior to the installation of the protection course.

3.04 PROTECTION COURSE INSTALLATION

- A. Install protection course over waterproofing membrane according to manufacturer's written instructions and before beginning subsequent construction operations.
- B. Clean and dry membrane before applying adhesive and setting protection course in adhesive.
- C. Apply adhesive at a rate of 2.0 to 2.5 gallons per 100 square feet.
- D. Set protection board course into adhesive after tack occurs. Apply sheets with 3” side and end-laps adhesively sealed.

3.05 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

- A. Place and secure molded-sheet drainage panels to substrate according to manufacturer's written instructions. Protect installed molded-sheet drainage panels during subsequent construction.

3.06 CURING, PROTECTING, AND CLEANING

- A. Cure waterproofing according to manufacturer's written recommendations, taking care to prevent contamination and damage during application stages and curing.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

## PART 1 - GENERAL

### 1.01 SUMMARY

- A. This Section includes:
  - 1. Water Resistive Barrier/Air Barrier – Sheet
  - 2. Water Resistive Barrier – Liquid Applied
  - 3. Liquid Applied Flashing
  - 4. Self-Adhesive Membrane Flashing
- B. Related Sections:
  - 1. Section 07 62 00 – Sheet Metal Flashing and Trim

### 1.02 SUBMITTALS

- A. General, submit in accordance with Division 01.
- B. Membrane System Product Data: Provide current standard printed product literature indicating characteristics of membrane materials, flashing materials, components, and accessories product specification and installation.
- C. Product Samples: Submit product samples of membrane and flashing materials showing color, texture, thickness and surfacing representative of the proposed system for review and approval by the Architect.
- D. Submit sample copies of both the Manufacturer and Applicator warranties for the periods stipulated. Each specimen must be a preprinted representative sample of the issuing company's standard warranty for the system specified.
- E. Submit copies of current Material Safety Data Sheets (MSDS) for all components of the work.

### 1.03 REFERENCES

- A. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual.
- B. ACI-308 - Recommended Practice for Curing Concrete
- C. ASTM - D638 - Test Methods for Tensile Properties of Plastics
- D. ASTM - D4258 - Standard Practice for Surface Cleaning Concrete for Coatings
- E. ASTM - D4259 - Standard Practice for Abrading Concrete
- F. ASTM - D4541 - Method for Pull-Off Strength of Coatings using Portable Adhesion Tester
- G. ASTM - E96(A) - Test Methods of Moisture Transmission of Material

- H. ASTM E-108, ANSI/UL 790 for fire resistance.
- I. International Concrete Repair Institute Guideline 03732 Concrete Surface Preparation

#### 1.04 QUALITY ASSURANCE

- A. Evaluate moisture content of substrate materials. Contractor shall determine substrate moisture content throughout the work and record with Daily Inspection Reports or other form of reporting acceptable to the Owner or designated Representative, and Membrane Manufacturer.

#### 1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect WRB materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing and protecting during installation.
- B. Materials shall be delivered in original, unopened containers bearing name of manufacturer, product identification and reference to UL testing.
- C. Store solvent-bearing solutions, resins, additives, inhibitors or adhesives in accordance with the MSDS and/or local fire authority.

#### 1.06 WARRANTY

- A. Manufacturer's Standard Warranty: Provide 10 year manufacturer's standard warranty under provisions of this section. This warranty provides for cost of labor and materials for loss of watertightness, limited to amounts necessary to effect repairs necessitated by either defective material or defects in related installation workmanship, with total expenditure limited to the original cost to the Owner.
- B. Submit (2) executed copies of both the manufacturer and applicator warranties for the periods stipulated, starting from the date of substantial completion. Each warranty must be signed by an authorized representative of the issuing company.

### PART 2 – PRODUCTS

#### 2.01 MEMBRANE, SHEET

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Air-Infiltration Barrier (noted as "Water Resistive Barrier" on the drawings): Triple-layered heat-bonded polypropylene fabric sheets with a middle layer of spun-bonded polypropylene fabric, equal to VaproShield WrapShield Water-Resistive Vapor- Permeable Air Barrier Sheet.
  - 1. Referenced Standards:
    - a. AATCC 127 Test Method for Water Resistance: Hydrostatic Pressure Test
    - b. ASTM D 882 Test Method for Tensile Properties of Thin Plastic Sheeting
    - c. ASTM E 84 Test Method for Surface Burning Characteristics of Building Materials.

- d. ASTM E 96/ E96 M Test Methods for Water Vapor Transmission of Materials
  - e. ASTM E 283 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
  - f. ASTM E 21780 Standard Test Method for Air Permeance of Building Materials
2. Accessories:
- a. Fasteners to secure Wrapshield: Vapro Caps and bugle head screws.
  - b. Sealant to seal vertical laps in the Wrapshield: Dow 758 sealant.

## 2.02 WATER BASED PRIMER FOR RAW GYPSUM BOARD EDGES AT FLUID APPLIED WRB

- A. Acceptable product: PROSOCO R-GUARD® GypPrime
1. Substitutions under provisions of 01 25 00
- B. Description: (for use with liquid applied flashing assembly) GypPrime consolidates and seals the cut edges of gypsum wallboards where they are exposed in rough openings for windows and doors. The sealed edge makes a compatible surface for easy application of R-GUARD Joint & Seam Filler fiber-reinforced fill coat and seam treatment for through-wall components. GypPrime brushes or sprays on easily and is usually dry in 30 minutes.
- C. Characteristics:
1. Form: milky blue liquid, mild odor
  2. Specific Gravity: 1.01
  3. pH: 8.5
  4. Weight per Gallon: 8.41 pounds
  5. Active Content: 18 percent
  6. Total Solids: 18 percent ASTM-D-2369
  7. Volatile Organic Content (VOC): less than 100 grams per Liter
  8. Flash point: greater than 212 degrees Fahrenheit (greater than 100 degrees Celsius) ASTM-D-3278
  9. Freeze Point: 32 degrees Fahrenheit (0 degrees Celsius)
  10. Shelf Life: 1 year in tightly sealed, unopened container

## 2.03 JOINT & SEAM FILLER FIRE REINFORCED FILL COAT AND SEAM FILLER AT FLUID APPLIED WRB

- A. Characteristics:
1. Thickness: Apply according to manufacturer's instructions. See product data sheet.
  2. Hardness: Shore A, 45-50 when tested in accordance with ASTM C661.
  3. Water vapor permeability: Minimum 14 perms when tested in accordance with ASTM E-96.
  4. Tensile strength: 225 psi when tested in accordance with ASTM D412.
  5. Lap shear strength: 275 psi when tested in accordance with ASTM D1002.
  6. Elongation at break: 275% when tested in accordance with ASTM D412.
  7. Peel strength: 30 pli when tested in accordance with ASTM D1781.
  8. Shrinkage: None.
  9. Form: pale red, gun-grade sealant
  10. Specific gravity: 1.40 to 1.50
  11. pH: not applicable

12. Weight per gallon: 11.8 pounds
13. Active content: 99 percent
14. Total solids: 99 percent
15. Volatile organic content (VOC): 30 grams per Liter, maximum
16. Flash point: no data
17. Freeze point: no date
18. Shelf life: 1 year in tightly sealed, unopened container

2.04 LIQUID-APPLIED FLASHING MEMBRANE at fluid applied wrb

- A. Acceptable product: PROSOCO R-GUARD® FastFlash®
  1. Substitutions under provisions of 01 25 00
- B. Description: (for use with liquid applied flashing assembly) FastFlash® is a gun-grade waterproofing, adhesive and detailing compound that combines the best of silicone and polyurethane properties. This single component, 99% solids, Silyl-Terminated-Poly-Ether (STPE) is easy to gun, spread and tool to produce a highly durable, seamless, elastomeric flashing membrane in rough openings of structural walls.
- C. Characteristics:
  1. Thickness: Apply according to manufacturer's instructions.
  2. Water vapor permeability: Minimum 14 perms when tested in accordance with ASTM E96.
  3. Water penetration (cyclical static air pressure difference): No uncontrolled water penetration when tested in accordance with ASTM E547.
  4. Hardness: Shore A, 40-45 when tested in accordance with ASTM C661.
  5. Tensile strength: 180 psi when tested in accordance with ASTM D412.
  6. Elongation at break: 400% when tested in accordance with ASTM D412.
  7. Peel strength: 25 pli when tested in accordance with ASTM D1781.
  8. Form: Brick Red, Gun Grade Sealant.
  9. Specific gravity: 1.45 to 1.60
  10. pH: not applicable
  11. Weight per gallon: 12.5 pounds
  12. Active content: 99 percent
  13. Total solids: 99 percent
  14. Volatile organic content (VOC): 30 grams per Liter, maximum
  15. Flash point: no data
  16. Freeze point: no dataShelf life: 1 year in tightly sealed, unopened container

2.05 FLUID APPLIED WATER RESISTIVE BARRIER SYSTEM

- A. Fluid applied, waterproofing and air and water barrier membrane (for use over concrete substrates). Noted as 'Weather Resistive Barrier, Fluid Applied' on the drawings.
- B. Acceptable product: PROSOCO R-Guard Cat 5.
  1. Substitutions under provisions of 01 25 00

- C. Description: Cat 5® Air & Water-Resistive Barrier is a fluid applied, waterproofing and air barrier that combines the best of silicone and polyurethane properties. This single component, 98% solids Silyl-Terminated-Poly-Ether (STPE) is roller applied to produce a highly durable, seamless, elastomeric weatherproofing membrane on structural sheathing and back-up CMU walls.
- D. Characteristics:
1. Thickness: Apply in accordance with manufacturer's instructions. See product data sheet.
  2. Air infiltration: Less than 0.004 cfm per square foot (0.02 L/s/sq m) when tested in accordance with ASTM E2178 or ASTM E283.
  3. Water vapor permeability: Minimum 23 perms when tested in accordance with ASTM E96.
  4. Structural performance: Air and water-resistive barrier system shall withstand positive and negative wind pressure loading when tested in accordance with ASTM E330.
  5. Water penetration (static pressure): No uncontrolled water penetration when tested in accordance with ASTM E331, with differential static pressure not less than 6.24 psf.
  6. Water penetration (cyclical static air pressure difference): No uncontrolled water penetration when tested in accordance with ASTM D547.
  7. Hardness: Shore A, 20-25 when tested in accordance with ASTM C661.
  8. Tensile strength: 110 psi when tested in accordance with ASTM D412.
  9. Elongation at break: 300% when tested in accordance with ASTM D412.
  10. Peel strength: 30 pli when tested in accordance with ASTM D1781 or C794.
  11. Shrinkage: None.
  12. Form: adobe brown heavy liquid
  13. Specific gravity: 1.5 to 1.7
  14. pH: not applicable
  15. Weight per gallon: 13.312 pounds
  16. Active content: 98 percent
  17. Total solids: 98 percent
  18. Volatile organic content (VOC): 30 grams per Liter, maximum
  19. Flash point: greater than 200 degrees Fahrenheit (greater than 93 degrees Celsius)
  20. Freeze point: not applicable
  21. Shelf life: 1 year in tightly sealed, unopened container

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. All surfaces must be sound, clean and free of oil, grease, dirt, excess mortar or other contaminants detrimental to the adhesion of the water resistive air barrier flashings. Fill voids, gaps in substrate to provide an even surface. Strike masonry joints full-flush.
- C. Minimum application temperature self-adhered membrane flashings to be above 20 degrees F (minus 6.0 degrees C).

- D. Ensure all preparatory Work is complete prior to applying primary water-resistive weather barrier membrane.
- E. Mechanical fasteners used to secure sheathing boards or penetrate sheathing boards shall be set flush with sheathing and fastened into solid backing.

### 3.02 SURFACE PREPARATION

- A. Air, water-resistive and waterproofing membrane and accessories may be applied to green concrete 16 hours after removal of forms.
- B. Refer to manufacturer's product data sheets for requirements for condition of and preparation of substrates.
  - 1. Surfaces shall be sound and free of voids, spalled areas, loose aggregate and sharp protrusions.
  - 2. Remove contaminants such as grease, oil and wax from exposed surfaces.
  - 3. Remove dust, dirt, loose stone and debris.
  - 4. Use repair materials and methods that are acceptable to manufacturer of the air and water-resistive barrier system.
- C. Masonry and concrete substrates:
  - 1. Masonry head and bed joints should be fully filled and tooled.
  - 2. Mechanically remove loose mortar fins, mortar accumulations and protrusions, and debris.
- D. Metal Studs:
  - 1. Cover knockouts in metal studs with flat stock sheet metal mechanically attached with pan head screws to provide substrate for the liquid flashing.

### 3.03 INSTALLATION OF JOINT TREATMENT (PREPARE):

- A. Apply Joint & Seam Filler for seams, joints, cracks, gaps, primed rough gypsum edges at sheathing, rough openings:
  - 1. Fill or repair cracks larger than one-half inch.
  - 2. Fill surface defects and over driven fasteners with Joint & Seam Filler.
  - 3. Using a dry knife, trowel or spatula, tool and spread the product. Spread one inch beyond seam at each side to manufacturer's recommended thickness. See product data sheet.
  - 4. Allow to skin before installing other waterproofing or air barrier components.
  - 5. Apply in accordance with manufacturer's Application Guideline illustrations.

### 3.04 FLASHING AT WINDOWS, DOORS, OPENINGS AND PENETRATIONS (PREPARE):

- A. Apply liquid flashing membrane over surfaces prepared with Joint & Seam Filler to seal and waterproof rough openings:
  - 1. Apply a thick bead of liquid flashing membrane over any visible gaps in the prepared rough opening.
  - 2. Immediately press and spread the wet product into gaps.
  - 3. Allow treated surface to skin.

4. Starting at the top, apply a thick bead of liquid flashing membrane in a zigzag pattern to the structural wall surrounding the rough opening.
5. Spread the wet product to create an opaque, monolithic flashing membrane which surrounds the rough opening and extends 4 to 6 inches over the face of the structural wall. Apply and spread additional product as needed to create an opaque, monolithic flashing membrane free of voids and pin holes.
6. Apply additional product in a zigzag pattern over a structural framing inside the rough opening.
7. Apply liquid flashing membrane within temperature and weather limitations as required by manufacturer.
8. Apply liquid flashing membrane perimeters, sills and adjacent sheathing and building face, in accordance with manufacturer's product data sheet and R-GUARD Installation Guidelines illustrations.
9. Extend flashing onto building face 4 to 6 inches.
10. Install preparation products in accordance with manufacturer's Application Guideline illustrations.

### 3.05 AIR & WATER-RESISTIVE BARRIER INSTALLATION (PROTECT):

- A. Apply appropriate air and water-resistive barrier to a clean, dry substrate (clean, dry, and/or damp substrates –waterproofing air-barrier membrane), within temperature and weather limitations as required by manufacturer.
  1. Apply to recommended thickness. Proper thickness is achieved when coating is opaque.
  2. Allow product to cure and dry.
  3. Inspect membrane before covering. Repair any punctures, translucent or damaged areas by applying additional material.
  4. Specifier Note: If air or surface temperature exceed 95 degrees Fahrenheit (35 degrees Celsius), apply to shaded surfaces and before daytime air and surface temperatures reach their peak.
  5. On CMU wall construction back roll as necessary to ensure there are no pinholes, voids or gaps in the membrane. R-GUARD Cat 5<sup>®</sup> is roller applied.

### 3.06 FLASHING TRANSITIONS (TRANSITION)

- A. Apply Joint & Seam Filler and liquid flashing membrane as a liquid flashing membrane to waterproof the transitions in rough opening and between dissimilar materials.
  1. Fill any voids between the top of the flashing leg and the vertical wall with Joint & Seam Filler. Tool to direct water from the vertical wall to the flashing.
  2. Apply a generous bead of liquid flashing membrane to the top edge of the flashing leg.
  3. Spread the wet products to create a monolithic "cap-flash" flashing membrane extending 2 inches up the vertical face of the structural wall and 1 inch over the flashing membrane. Apply additional product as needed to achieve a void and pinhole free surface. This "liquid termination bar" helps secure the flashing and ensures positive drainage from the wall surface to the flashing.
  4. Allow coated surfaces to skin before installing other wall assembly, waterproofing or air barrier components.

### 3.07 AIR AND WEATHER BARRIER SEALANT FOR WINDOWS AND DOORS INSTALLATION

- A. Install sealant with professional grade caulking gun in continuous beads without air gaps or air pockets.
  - 1. Apply sealant to a clean, dry or damp surface
  - 2. Install Backer rod: Compressible, closed cell rod stock as recommended by manufacturer for compatibility with sealant. Provide size and shape of rod to control joint depth
  - 3. Install sealant to provide uniform, continuous ribbons without gaps or air pockets, with complete wetting of the joint bond surfaces.
  - 4. Tool sealant immediately to ensure complete wetting of joint bond surface and to produce a smooth, concave joint profile flush with the edges of the adjacent surfaces. Where horizontal and vertical surfaces meet, tool sealant to create a slight cove so as to not trap moisture or debris.
  - 5. Do not allow materials to overflow onto adjacent surfaces. Prevent staining of adjacent surfaces.
  - 6. Remove excess and misplaced materials as work progresses. Clean the adjoining surfaces to remove misplaced materials, without damage to adjacent surfaces or finishes.

### 3.08 PROTECTION

- A. Protect wall areas covered with primary water-resistive vapor permeable air barrier from damage due to construction activities, high wind conditions, and extended exposure to inclement weather.
- B. Review condition of water-resistive weather barrier prior to installation of cladding. Repair, or remove and replace damaged sections with new membrane.
- C. Recommend to cap and protect exposed back-up walls against wet weather conditions during and after application of membrane, including wall openings and construction activity above completed primary water-resistive weather barrier installations.
- D. Remove and replace water-resistive vapor barrier permeable air barrier affected by chemical spills or surfactants.

END OF SECTION

## PART 1 – GENERAL

### 1.01 SECTION INCLUDES

- A. Drawings and general provisions of the Project Manual apply to the work of this section.

### 1.02 RELATED SECTIONS

- A. Section 03 01 30.71 – Concrete Rehabilitation
- B. Section 03 30 00 – Cast In-Place Concrete
- C. Section 08 41 13 Aluminum Storefront
- D. Section 09 55 00 – High Performance Architectural Coatings

### 1.03 REFERENCED STANDARDS

- A. Work shall conform, at a minimum, to the requirements of the 2018 International Building Code (IBC).
- B. ASTM C 1193-16 (Most Current Edition), Standard Guide for Use of Joints Sealants.
- C. ASTM C920-16 (Most Current Edition), Standard Specification for Elastomeric Joint Sealants.
- D. ASTM C 1248 “Standard Test Method for Staining of Porous Substrate by Joint Sealants”
- E. ASTM C 1311 “Standard Specification for Solvent Release Sealants”
- F. ASTM C 1330 “Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants”
- G. Sealants: The Professionals’ Guide, published by the Waterproofing & Restoration Institute (SWR), 1995 or most current edition.

### 1.04 SUMMARY

- A. Extent of each type of sealant work is indicated on drawings and by provisions of this section.
- B. This section includes sealants for the following applications
  - 1. Exterior joints: in the following vertical surfaces and non-traffic horizontal surfaces:
    - a. Joints between different materials.
  - 2. Sealant Work: At all locations where sealant performs as the primary or secondary weather barrier for the various Project related sheet metal and trim, roofing and related accessories, rough carpentry, wall cladding, locations, such as in joints and overlaps of the sheet metal-to-saddle junctions, sheet metal coping joints, counterflashing, at metal joinery equipment, the tops of lead plumbing flashings, storm collars, where flashing materials are sequenced into the new specified roof membrane system, new roof system, and/or wall cladding, architectural features, door frames at building transitions, and all other junctures where materials intersect, remove old sealants (if and where present), clean and, as required, prime substrates, and apply new specified sealant, watertight and airtight in proper configuration that will allow long-term successful performance and dimensional movement of the sealant section.

3. Sealing of all random cracks, formed in the existing portions of the deck slab and against building and exterior barrier walls, as required for membrane system coatings and as indicated on Drawings.

#### 1.05 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seal without causing staining or deterioration of joint substrates.
- B. Compliance with ASTM C920, Standard Specification for Elastomeric Joint Sealants
- C. Compliance with ASTM C1193, Standard guide for use of Joint Sealants.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in original unopened containers or bundles with labels informing about manufacturer, project name and designation, color, expiration period for use, pot life, curing time and mixing instructions for multi-component materials.
- B. Store and handle materials to prevent their deterioration or damage due to moisture, temperature change, contaminants, or other causes.

#### 1.07 SUBMITTALS

- A. General: Submit in accordance with Division 01 Submittals.
- B. Product Safety Data Sheets from manufacturers for each joint sealant required.
- C. Samples for initial selection purposes in form of manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.
- D. Submit Manufacturer's letter of certification that the products meet or exceed specified requirements and are appropriate for the uses indicated..
- E. Submit proposed method and details for treatment of cracks and other defects on concrete surface.

#### 1.08 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed joint sealant application similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.
- B. Joint Sealant Materials: Install joint sealant materials from a single approved manufacturer for each different product required.
- C. Install exterior sealant joint that are long term watertight, waterproof, and weatherproof.

#### 1.09 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturers. Or below 40 deg. F (4.4 deg. C)
  2. When joint substrates are wet due to rain, frost, condensation, or other causes
- B. Joint Width Conditions: Do not proceed with installation of joint sealers when joint widths are less than allowed by joint sealant manufacturer for application indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.

#### 1.10 SEQUENCING AND SCHEDULING

- A. Sequence installation of joint sealers work of other trades so that substrates to be sealed are ready for sealant, so that locations to receive sealant are not covered by other work before sealant is applied, and so that sealant joints are allowed to fully cure without damage from construction.
- B. Sequence installation of joint sealers to occur not less than 21 nor more than 30 days after completion of waterproofing unless otherwise indicated.

#### 1.11 WARRANTY

- A. Installer's warranty: Written warranty, signed by installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within the specified warranty period.
1. Warranty period: 1 year from the date of Physical Completion
- B. Manufacturer's warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty period: 10 years from the date of Physical Completion

### PART 2 – PRODUCTS

#### 2.01 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by testing and field experience.
- B. Colors: Provide selection made by Engineer from manufacturer's standard colors for products of type indicated.
- C. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168, VOC Limits, effective January 7, 2005.
1. Sealants: 250 g/L (less water).

2. Sealant Primers for Nonporous Substrates: 250 g/L (less water).
3. Sealant Primers for Porous Substrates: 775 g/L (less water).

## 2.02 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant which complies with ASTM C 920 requirements, including those for Type, Grade, Class, and intended uses indicated in the 'Joint Sealant Schedule' located at end of this section.
- B. Available Products: Subject to compliance with requirements, elastomeric sealants that may be incorporated in the Work include, but are not limited to, the products specified in the "Joint Sealant Schedule" located at the end of this section.

## 2.03 TAPE SEALANTS

- A. Tape Sealant: Manufacturer's standard, solvent-free, butyl-based tape sealant with a solids content of 100 percent formulated to be non-staining, paintable, and non-migrating in contact with nonporous surfaces with or without reinforcement thread to prevent stretch and packaged on rolls with a release paper on one side.
- B. Available Products: Subject to compliance with requirements, tape sealants that may be incorporated in the Work include, but are not limited to, the following:
  1. "Extr-Seal Tape," Pecora Corporation
  2. "Shim-Seal Tape," Pecora Corporation
  3. "PTI 606," Protective Treatments, Inc.
  4. "Tremco 440 Tape," Tremco, Inc.
  5. "MBT-35," Tremco, Inc.

## 2.04 JOINT SEALANT BACKING:

- A. General: Provide sealant backings of material and type that are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Plastic Foam Backer Rod: Preformed, compressible, resilient, non-staining, non-waxing, non-extruding strips of flexible plastic foam of material indicated below and of size and shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, non-out-gassing in unruptured state and with diameter 40% greater than the joint width.
- D. Bond Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back or joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

## 2.05 SELF LEVELING POLYURETHANE SEALANT

### A. Product Manufacturers

1. Sonneborn, Product: Sonolastic SL2, Degussa
2. Iso-Flex 880 GB, Lyntal
3. Sika, Product: Sikaflex-2x SL and NS, Sika
4. THC-900/THC-901 or Vulkem 245, Tremco
5. Substitutions in accordance with Section 01 60 00 - Product Requirements.

### B. Color to match existing concrete. Grey.

## 2.06 MISCELLANEOUS MATERIALS

A. Primer: Provide type recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from pre-construction joint sealant substrate and field tests.

B. Cleaners for Nonporous Surfaces: Provide non-staining, chemical cleaner of type acceptable to manufacturer of sealant and sealant backing materials, which are not harmful to substrates and adjacent nonporous materials.

C. Masking Tape: Provide non-staining, pressure sensitive non-absorbent type compatible with joint sealants and to surfaces adjacent to joints as applicable, easily removable upon completion.

D. Accessory Materials for Fire-Stopping Sealants: Provide forming, joint fillers, packing and other accessory materials for installation of fire-stopping sealants as applicable to installation conditions indicated.

E. Other Materials: Bond breaker, closed cell backer rod.

## PART 3 – EXECUTION

### 3.01 INSPECTION

A. Require installer to inspect joints indicated to receive joint sealers for compliance with requirements for joint configurations, installation tolerances and other conditions affecting joint sealant performance.

B. Do not allow joint sealant work to proceed until unsatisfactory conditions have been corrected. Beginning of installation means installer accepts existing substrate.

### 3.02 PREPARATION

A. Sawcut and grind cracks to be sealed to provide a crack opening profile as shown on the Drawings.

- B. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealant manufacturers and the following requirements:
- C. Remove all foreign material from joint substrates which could interfere with adhesion and cohesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; oil; grease; waterproofing; water repellents; water; surface dirt, fungus, efflorescence, laitance, release agents, and frost.
- D. Clean porous joint substrate surfaces to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
- E. Clean non-porous surfaces by chemical cleaners or other means, which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers as recommended by joint sealant manufacturer.
- F. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on pre-construction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primer to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
- G. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing seal.

### 3.03 INSTALLATION OF JOINT SEALERS

- A. General: Comply with joint sealant manufacturer's printed installation instructions, including "tooling" and all techniques applicable to products and applications indicated, except where more stringent requirements apply
- B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C 962 for use of joint sealants as applicable to materials, applications and conditions indicated.
- C. Latex Sealant Installation Standard: Comply with requirements of ASTM C 790 for use of latex sealants
- D. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
  - 1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths, which allow optimum sealant movement capability.
    - a. Do not leave gaps between ends of joint fillers.
    - b. Do not stretch, twist, puncture, or tear joint fillers

- c. Remove absorbent fillers, which have become wet prior to
    - d. sealant application and replace with dry material.
  2. Install bond breaker tape between sealants and joint fillers, compression seals, or back of joints where adhesion of sealant to surfaces at back of joints could result in sealant failure.
- E. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.
- F. Tooling of non-sag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
  1. Provide concave joint configuration per Figure 6A in ASTM C 962, unless otherwise indicated.
    - a. Use masking tape to protect adjacent surfaces of recessed tooled joints

#### 3.04 PROTECTION AND CLEANING

- A. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of physical completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealant installations with repaired areas indistinguishable from original work and watertight.
- B. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.
- C. When using flammable solvents, avoid heat, sparks and open flames. Provide necessary ventilation. Follow all precautions and safe handling recommendations from the solvent Manufacturer and pertinent local, state and federal regulations.

#### 3.05 ELASTOMERIC JOINT SEALANT SCHEDULE

- A. Non-staining Silicone Joint Sealants:
  1. No staining of substrates when tested according to ASTM C 1248.
  2. Silicone, Non-staining, S, NS, 50, NT: Non-staining, single-component, non-sag, plus 50 percent and minus 50 percent movement capability, non-traffic-use,
  3. neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
  4. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Dow Corning 795;
    - b. Pecora 895 NST;

- c. GE Momentive – SCS2000 Silpruf;
    - d. or Project Approved Equal submitted through the Substitution Request and Potentially Approved by the Project Architect.
- B. Polyurethane Joint Sealants
  1. Urethane, S, NS, 25, NT: One-part silyl-terminated, non-sag, non-traffic use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
  2. Use related to Joint Substrates: M, G, and as applicable, to joint substrates indicated, O.
  3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. BASF – Master Seal 150
    - b. or Project Approved Equal submitted through the Substitution Request
- C. Self-leveling Polyurethane Sealant
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. BASF, Product: Master Seal SL2
    - b. Iso-Flex 880 GB, Lyntal
    - c. Sika, Product: Sikaflex-2x SL, Sika
    - d. THC-900/THC-901 or Vulkem 245, Tremco
    - e. or Project Approved Equal submitted through the Substitution Request
- D. Butyl Joint Sealants
  1. Non-Skinning Butyl-Rubber-Based Joint Sealants: ASTM C 1311.
  2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Sika – Sikalastomer 511;
    - b. Pecora BA-98;
    - c. Tremco – JS-773 Synthetic Butyl Sealant;
    - d. or Project Approved Equal submitted through the Substitution Request and Potentially Approved by the Project Architect.

END OF SECTION

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

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

### 1.02 SUMMARY

#### A. Section Includes:

1. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Light frames and glazing installed in hollow metal doors.
4. Zinc coating for hollow metal doors in a marine environment

#### B. Related Sections:

1. Division 01 Section "General Conditions".
2. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
3. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
4. Division 08 Section "Door Hardware".
5. Division 09 Sections "High Performance Coatings" for painting hollow metal doors and frames.

#### C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
9. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
10. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
11. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
12. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.

13. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
14. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
15. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
16. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

### 1.03 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".
- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40" above sill) or UL 10C.
  1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
  2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
  3. Smoke Control Door Assemblies: Comply with NFPA 105.
    - a. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
- D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.
- E. Storm Shelter Openings: Provide complete door systems for hurricane or tornado storm shelters, and other areas of refuge, complying and tested according to ICC 500 (2014/2020), ICC/NSSA Standard for the Design and Construction of Storm Shelters.
  1. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.
- F. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

### 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.
  - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

#### 1.05 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

#### 1.06 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Building Information Modeling (BIM) Support: Utilize designated BIM software tools and obtain training needed to successfully participate in the Project BIM processes. All technical disciplines are responsible for the product data integration and data reliability of their Work into the coordinated BIM applications.

#### 1.07 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:
  - 1. CECO Door Products (C).
  - 2. Curries Company (CU).

#### 2.02 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 38 percent.
- D. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

### 2.03 HOLLOW METAL DOORS

- A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.
- B. Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
  - 1. Design: Flush panel.
  - 2. Core Construction: Manufacturer's standard polystyrene. Where indicated, provide doors fabricated as thermal-rated assemblies with a minimum R-value of 2.8 or better.
  - 3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
  - 4. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
  - 5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
  - 6. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
  - 1. Design: Flush panel.
  - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, or one-piece polystyrene core, securely bonded to both faces.
    - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
  - 3. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.

4. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.
  5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
  6. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- D. Manufacturers Basis of Design:
1. Curries Company (CU) - Polystyrene Core - 707 Series.

#### 2.04 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.
1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
  2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
  3. Manufacturers Basis of Design:
    - a. Curries Company (CU) – M CM Series.
- C. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
  2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
  3. Manufacturers Basis of Design:
    - a. Curries Company (CU) - M Series.
- D. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
- E. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

#### 2.05 FRAME ANCHORS

- A. Jamb Anchors:
1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
  2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.
- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.
- C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

## 2.06 LIGHT OPENINGS AND GLAZING

- A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator's shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.
- B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.
- C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.
- D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

## 2.07 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

## 2.08 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.
- C. Hollow Metal Doors:
  - 1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
  - 2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.
  - 3. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.

4. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
- D. Hollow Metal Frames:
1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
  2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
    - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
  3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
  4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
  5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
  6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
  7. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
  8. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
  9. Jamb Anchors: Provide number and spacing of anchors as follows:
    - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      - 1) Two anchors per jamb up to 60 inches high.
      - 2) Three anchors per jamb from 60 to 90 inches high.
      - 3) Four anchors per jamb from 90 to 120 inches high.
      - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
    - b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      - 1) Three anchors per jamb up to 60 inches high.
      - 2) Four anchors per jamb from 60 to 90 inches high.
      - 3) Five anchors per jamb from 90 to 96 inches high.
      - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
      - 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
  10. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
  11. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or

asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.

- E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
  - 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
  - 2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
  - 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
  - 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

## 2.09 STEEL FINISHES

- A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Coating system for exterior and interior doors and frames in environments with aggressive corrosion, coastal exposure, or physical abuse.
- B. Basis of Design: Tnemec Company
  - 1. System Type: Organize zinc rich/ Epoxy/Fluorourethane
  - 2. Surface Preparation: SSPC-SP6
  - 3. Shop Primer: Series 294 Perimeprime. DFT 2.5 to 3.5 mils
  - 4. Shop or Field Intermediate Coat: Series N689 Expoxoline II @3.0 to 5.0 mils
  - 5. Field Finish Coat: Series 1071V Fluoronar DFT 2.0 to 3.0 mils
  - 6. Total DFT: 7.5-11.5 mils

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

- A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

- B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.
- E. Verify tolerances against manufacturers installations instructions for tornado and hurricane storm shelter openings.

### 3.03 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
  - 1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
  - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
  - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
  - 4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
  - 1. Non-Fire-Rated Standard Steel Doors:
    - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
  - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

### 3.04 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace

- defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
  - C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

### 3.05 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
  - 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

END OF SECTION

## PART 1-GENERAL

### 1.01 RELATED DOCUMENTS

- A. Project Drawings and general provisions of the Construction Contract, including General and Supplementary Conditions, Division 01 Specification Sections and bidding requirements, apply to the work of this Section.

### 1.02 SUMMARY

- A. General: Furnish all labor, materials, equipment, and services necessary and incidental to execution and completion of removal of existing fenestration system and installation of new, exterior Aluminum Framed fenestration systems according to the Contract Documents, this Section, and the Project Drawings where indicated. Installation shall coordinate with fenestration rough opening flashings, sealants, and shall be long-term weather proof, with all associated accessories as necessary for thorough water-tight and weather-proof installation of new extruded aluminum fenestration.
- B. This Section Includes Sliding Aluminum-framed glass doors including factory glazing, operating hardware and accessories designed for exterior applications.
- C. Related Sections:
  - 1. Section 02 41 19 – Selective Demolition
  - 2. Section 06 10 00 – Rough Carpentry
  - 3. Section 07 25 00 – Water Resistive Barrier
  - 4. Section 07 92 00 – Joint Sealants
  - 5. Section 08 41 13 – Aluminum Storefront
  - 6. Section 08 70 00 – Glazing
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. 2018 International Building Code (IBC), as amended by the State of Washington
  - 2. 2018 Washington State Energy Code.
  - 3. NFPA 80-Fire Doors and Windows.
- E. Standards:
  - 1. General: The following documents, industry standards, publications, and the information contain therein, shall guide the work, as applicable. The work shall be evaluated in compliance with the benchmark references and the Contract Documents, notify the Consultant promptly. The more conservative published requirement shall guide the work.
    - a) Architectural Sheet Metal Manual, published by Sheet Metal and Air Conditioning Contractors National Association (SMACNA), (1979[3rd Ed.] and 2003 [6th Ed], and most current edition).
    - b) Sealants: The Professionals' Guide, published by the Waterproofing & Restoration Institute (SWR), 1995.

- c) Manufacturers' technical data sheets, MSDS sheets, and installation instructions for each product specified and/ or used.
2. ASTM-American Society for Testing and Materials:
  - a) ASTM E 283-04 "Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors.
  - b) ASTM E330-02 "Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference."
  - c) ASTM E331-00 "Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference."
  - d) ASTM E 547 "Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential."
  - e) ASTM G85 Modified Salt Spray (Fog) Testing.
  - f) ASTM E774-00 "Specification for Sealant Insulating Glass Units."
  - g) ASTM E1105, Standard test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.
  - h) ASTM E-1886-02 "Standard for Testing Windows and Doors for Cyclic Wind Pressures."
  - i) ASTM E 1996-02 "Standards for Testing Windows and Doors for Windborne Debris (large Missile and small Missile)."
  - j) ASTM C1193, Standard Guide for Use of Joint Sealants.
  - k) ASTM E241, Standard Guide for Limiting Water Induced Damage of Buildings.
  - l) ASTM E2112-07 "Standard Proactive for Installation of Exterior Windows, Doors and Skylights."
3. AAMA- America Architectural Manufacturers Association:
  - a) AAMA /NWWDA 101/ I.S.2-97 "Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors."
  - b) AAMA 503-03 "Voluntary Specification for Field Testing of Windows and Sliding Glass Doors. "No reduction allowed.
  - c) AAMA 611-98 "Voluntary Specification for Anodized Architectural Aluminum."
  - d) AAMA 701-00 "Voluntary Specification for Pile Weather Stripping."
  - e) AAMA 800-92 "Voluntary Specification for Test Methods for Sealants,"
  - f) AAMA 906-96 "Voluntary Specification for Sliding Glass Door Roller Assemblies."
  - g) AAMA 1503-98 "Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, and Doors, and Glazed Wall Sections."
  - h) AAMA 2605-05 "Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels."
  - i) AAMA CW-10-97 "Care and Handling of Architectural Aluminum from Shop to Site."

### 1.03 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meeting: Convene one week before starting work of this section. Conduct conference at Project site with location as mutually agreed by owner's Project manager, General Contractor, Project Architect.
- B. Purpose and Agenda

1. Before the scheduled commencement of the Aluminum Framed storefront/ Entrance fenestration installation and associated flashing work, the Fenestration Installation Subcontractor, and related subcontractors (e.g., sheet metal subcontractors, etc.), and lead installers (foreperson) of each component of associated work, and other work in and around fenestration installation which must precede or follow fenestration installation shall attend a pre-Installation conference.
2. The meeting shall be conducted by the General Contractor and shall be attended by the Project Architect, Aluminum Fenestration Installation Subcontractor, and other directly concerned with the installation of the materials and performance of the Work including Aluminum Fenestration Manufacturer(s), other subcontractors, insurers, test agencies, and governing authorities. After the meeting, the Architect will furnish Pre-Installation Meeting Minutes to the parties in attendance. At the meeting, the group shall review the materials specified and procedures related to the Fenestration Installation Work, including but not necessarily limited to the following:
  - a. Distribution of any additional sets of Project Manuals, as may be needed.
  - b. Review requirements of Project Documents (Including Specifications and Drawings) as part of the Contract and submittals (both completed and yet to be submitted)
  - c. Review governing regulations and requirements for insurance, bonding, and certification. General safety and fall protection plans shall be described by the General Contractor. The consultants will explain project monitoring and testing as may be applicable.
  - d. Review Project Abatement Consultant's abatement requirements to ensure all abatement, containment, cleanup, and safety precautions are followed at all areas where asbestos containing, lead paint, or other hazardous materials are known, discovered, or suspected.
  - e. Review and finalize the General Contractor's Preliminary construction schedule related to fenestration Installation work, including the General Contractor's plan for coordination or the work of the various trades involved, and other items/ events impacting the Work. The contractor shall furnish a quality control plan for the Aluminum fenestration installation, including protection measures for the stored materials, installed components, property, building, and grounds, etc.
  - f. Review material(s) availability and the procurement of materials(s) and equipment yet to be delivered, material and equipment storage locations, and facilities needed to make continuous progress and avoid delays.
  - g. Review the Aluminum Fenestration installation subcontractor's supervisory and lead personnel, including cell phone numbers and emergency contact information. Equipment, power needs, any temporary facilities required for continuous Work progress and avoidance of delays will also be reviewed.
  - h. Review, discuss, and coordinate the interrelationship of Aluminum fenestration with other exterior wall components. Include provisions for anchoring, flashing, weeping, sealing perimeters, and protecting finishes.
  - i. Review and discuss the sequence of work required to construct a watertight and weather-tight exterior building envelope.
  - j. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.
  - k. Review Aluminum fenestration system and building protection requirements for construction period extending beyond fenestration installation, through final clean-

up and removal of all construction materials, demolished materials, and surplus materials, and review requirements for leak free terminations and tie-offs.

- I. Tour representative areas of the building, review and discuss scope of work for Aluminum fenestration installation, and related work. Review Alternated accepted by Owner related to the Project. As well as other preparatory work that may be performed by other trades.
- m. Review weather and forecast weather conditions, and discuss protection and procedures for coping with unfavorable conditions, emergencies, and other potential circumstances including possibility of temporary protection of buildings.

#### 1.04 SUBMITTALS

A. See Section 01 33 10 Submittals, for submittal procedures.

#### B. ACTION SUBMITTALS

1. Installation of fenestration shall not commence until complete submittal package for storefronts are reviewed and approved by the Project Architect[RS1].
2. Product Data: Submit Manufacturer's descriptive technical literature, data sheets, and installation instructions, including but not limited to:
  - a. Provide clear technical information regarding model numbers, series numbers, types, sizes, all accessories, and all other pertinent information
  - b. Construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, and operating instructions for each type of storefront indicated.
  - c. Submit color of Aluminum frame for review and approval by Owner, and Architect[RS2].
  - d. Licensed Structural Engineer stamped wind design pressure calculations indicating fenestration units and their attachment to building meet International Building Code Requirements[RS3].
3. Shop Drawings: Include plans, elevations, sections, details, hardware, accessories, attachment to other Work, and operational clearances. Include dimensions, relations to construction of adjacent work, air seal and weather seal to adjacent construction, component anchorage/ fastenings and locations, anchor/ fastening intervals, flashing details, methods and materials, and hardware details. Specifically include the following:
  - a. Fastening requirements, anchorage requirements, and rough opening requirement. Attachment details.
  - b. Mullion details, including integral reinforcement and stiffeners.
  - c. Fenestration schedule
  - d. Joinery Details
  - e. Expansion provisions
  - f. Weather stripping and gasketing details.
  - g. Fenestration rough opening flashing, sheet metal sill and head flashing, and associated flexible flashings.
  - h. Written certificate verifying specified flashing and sill pan is acceptable to Fenestration Manufacturer and will not negatively impact the Manufacturer's warranty.
  - i. Thermal break details
  - j. Glazing details.

- k. Stops, fasteners, and all other accessories
- 4. Samples for each exposed product and for each color specified, 12-inch long section with weather stripping, glazing bead, and factory applied color finish.
- 5. Samples for Verification:
  - a. Exposed finishes: 2" by 4" in color and finish selected by Owner/ Architect.
  - b. Exposed Hardware: Full Size units.
- C. INFORMATION SUBMITTALS
  - 1. Qualification Data: For installer, manufacturer and testing agency.
    - a. Manufacturer shall provide written documentation certifying that storefront assemblies have been tested, and meet specific structural and water penetration requirements, and all design requirements specified and drawn for Project.
      - i. Muller assemblies shall be tested according to AAMA 450 Option 1
  - 2. Published Maintenance Data: For all fenestration types.
  - 3. Qualification Data" For manufacturer and Installer.
  - 4. Sample Warranties: For manufacturer's warranties.
- D. CLOSEOUT SUBMITTALS
  - 1. Maintenance Data: For finishes, weather stripping, operable panels, and operating hardware to include in maintenance manuals.

#### 1.05 QUALITY CONTROL

- A. Contractor Requirements:
  - 1. Contractor shall provide experienced supervisors (i.e., Superintendent and Foreperson) and personnel (i.e., crew) to perform the work, who are trained in the application of the materials and procedures specified in this Specification. Contractor shall provide documentation from the Manufacturer that the contractor meets experience and training requirement for the specified system. Contractor shall maintain on-site supervision continuously to assure on going quality control for superior quality application.
  - 2. Contractor must have minimum five (5) years experience and specialize in installing Aluminum framed fenestration.
  - 3. The contractor shall be responsible for the quality control of all of their own work, as well as the work performed by the subcontractors working under this Specification, and/ or related specification which is considered part of the Project Contract.
  - 4. Contractor shall notify the Architect/ Consultant of any conflicts that may result in a deviation from the Manufacturer's Specifications, Industry standards, code compliance, job safety, or function as a result of the Project scope of Work, Specifications, and/ or Project Drawings.
  - 5. If the Architect, Consultant and/ or Specified Manufacturer determine that the quality of work does not conform to the Specifications, and Project drawings, and /or Manufacturer's requirements, as well as Industry Standards, the Contractor must correct all deficiencies and advise the Architect Consultant and Manufacturer of the corrective actions taken.

6. Contractor must demonstrate the ability to perform the work in a quality, timely manner with minimum noise and disruption to or impact on Owners, Guests, Employees, Patrons, and the Public.
  7. No modification to the Specifications, Project Drawings or substitutions of specified products shall be made without direct approval by the Project Architect. Contractor shall provide consultant with a written request for review and potential approval.
- B. Manufacturer's Responsibilities:
1. Manufacturer capable of fabricating extruded Aluminum framed fenestration that meets or exceeds performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations
  2. Demonstrate a minimum of ten (10) years of successful performance on similar projects:
  3. Manufacturer's Technical services representatives shall be available for technical information and project-site meetings, and be thoroughly experienced with the products to be installed, installation requirements and practices, quality control of the installation.
  4. Prior installation, Manufacturer shall provide any and all published special considerations for the suitability, installation, use, and maintenance of their Product(s) in the geographical area and climate where construction will take place.
- C. Source Limitations: Single source responsibility
1. Obtain extruded aluminum-framed fenestration system from single source from single manufacturer.

#### 1.06 QUALITY ASSURANCE

- A. The General Contractor and Subcontractor shall be responsible for complete, watertight, and weatherproof building envelope systems and assemblies. The contractor shall establish and follow best practices for the trade and of quality-control and quality assurance to assure each and every building envelope systems successful completion.
- B. On-Site Observation: The Owner reserves the right to have the Consultant perform observation or monitoring of the flashings and fenestration installation. Such observation shall not relieve the Contractor of responsibility for proper execution and thorough completion of the work.
- C. Outstanding items and efforts to resolve them may be reviewed during Construction Progress Meetings. Action Items identified in Field Reports shall be attended to by the Contractor. The Contractor and their Subcontractors shall cooperate fully with the Consultant, the Consultant's Monitors, and all mock-ups and testing.
- D. Performance Testing: Select installed fenestration shall be tested per ASTM E1105 to ensure fully weather tight, leak-free performance. No reduction in test pressure shall be allowed.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site undamaged in Manufacturer's or sales branch's original, unopened containers and packaging, with labels clearly identifying manufacturer and product name. Include installation instructions.
- B. Handle fenestration to prevent damage to components and to finishes.
- C. Protect fenestration from moisture, construction traffic, full sun, and damage. Store fenestration out of contact with ground, fully upright, and protected from wracking, bending, or other distortion and/ or breakage. Protect fenestration in well-ventilated and covered, dry area. Extruded aluminum framed fenestration systems shall be kept dry until installed and flashed.
- D. Protect window sashes, glazing, frames, and extrusions. Replace units delivered with damaged frames or components. Units with damage to frames are not to be repaired and must be removed from the site and replaced with new.
- E. Protect fenestration from condensation; do not use non-vented plastic or other covering that causes condensation. Provide ¼". Space between units to promote air circulation.

#### 1.08 PROJECT AND ENVIRONMENTAL CONDITIONS

- A. Field Measurements: The Contractor shall verify fenestration rough openings by field measurements before fabrication and indicate measurements on Shop Drawings. The Contractor shall provide the Project Team with a fenestration rough opening schedule that can be used for fenestration manufacture. Verify the size of each individual fenestration system rough opening to ensure the opening is adequate in size to accommodate the manufactured fenestration unit and all flashings and related components.
- B. Ensure substrates are clean, dry, fully prepared, and uncontaminated to allow full and successful bonding of flashing membrane and sealant. Do not install flashings and sealant to damp no wet substrates.
- C. Protect installed fenestration from construction, work of other trades, and weather and moisture, until fenestration are incorporated into complete weather resistive barrier and cladding and the Project is complete.

#### 1.09 MOCK-UPS

- A. Conduct in-situ mock-ups for flashing and installation of fenestration. The mock-ups may be scheduled and conducted to coincide with the Pre-Installation Meeting.
  - 1. Fenestration units shall be installed per Technical Specifications and Contract Drawings, including all rough opening flashing, sheet metal flashing, and sealant. Provide and install all necessary fenestration units, associated materials and components, labor, and services for the successful completion of the mock-ups.
  - 2. Plan, schedule, and execute the mock-ups such that the Owner's Representative, Architect and Consultant are present to observe construction and successful completion of the mock-ups.
  - 3. Construct full scale, in-situ mock-ups, which if accepted, may remain in place.

4. Verify that fenestration utilized in mock-ups conform to the performance requirements specified by this Section.
5. Confirm installation means and methods that will be repeated throughout work of this Section, including sealing of perimeter joint systems, installation of flashings, and primary watertight and secondary water shedding interface with adjacent construction.
6. Conform to Architectural intent and allow for minor adjustments.
7. Location: As directed by Architect and Envelope consultant.
8. Installation of fenestration flashing shall not commence until the mock-ups of each fenestration types are reviewed and approved by the Owner's Representative and Architect.
9. Approved mock-ups shall represent minimum quality required for the Work.
10. The fenestration mock-ups shall be coordinated with required Sealant Pull Testing (See Section 07 92 00 – Sealant) and water spray testing as applicable.

#### 1.10 REGULATORY AGENCY REQUIREMENTS

- A. General: Contractor shall comply with all applicable requirements to ensure the Owners' safety and security as specified herein, and with all applicable Federal, Washington State, and Local City of Bainbridge Island regulations, laws, and ordinances
- B. The Contractor shall comply with current Washington State and City of Bainbridge Island Building Codes. Report and conflicts with Material Manufacturer's installation instructions, Project Specifications, Detail Drawings, and/ or Applicable Codes to the Project Architect prior[RS4] to proceeding with the Work.
- C. The Contractor shall comply with the requirements of State of Washington Department of Industrial Relations, Washington Division of Occupational Safety and Health, Occupational Safety and Health Administration (OSHA), National Industry Occupational and Health (NIOSH), and all local governing authorities (e.g.,) for work place safety.

#### 1.11 SEQUENCING AND SCHEDULING

- A. Deliver to job in time for proper and timely installation.
- B. Coordinate with flashing of fenestration rough openings.
- C. Coordinate with all adjacent trades and systems to allow proper flashing of fenestration rough openings, and proper integration of fenestration rough opening flashing.

#### 1.12 CERTIFICATIONS

- A. Manufacture's Certification that products:
  1. Furnished for the Project meet or exceed specified requirements.
  2. Are suitable for the indicated use.

#### 1.13 MANUFACTURER'S WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace Aluminum fenestration that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Failure to meet performance requirements.
    - b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
    - c. Faulty operation of movable sash and hardware.
    - d. Deterioration of materials and finishes beyond normal weathering.
    - e. Corrosion.
    - f. Failure of insulating glass.
  - 2. Warranty Period
    - a. Fenestration Unit: 2 years from date of Substantial Completion.
    - b. Glazing Units: 10 years from date of Substantial Completion.

#### 1.14 GUARANTIES

- A. Contractor's Guarantee:
  - 1. Contractor shall guarantee that all fenestration are installed in accordance with the Project Documents, and will be free from defective workmanship and that the work will remain weatherproof with no premature defects for a period five (5) years from the date of substantial completion in addition to Project Warranty. [RS5][RS6]

### PART 2 – PRODUCTS

#### 2.01 MANUFACTURERS

- A. Source Limitations: Obtain Aluminum fenestration from single source from single manufacturer.
- B. Acceptable Manufacturers:
  - 1. Arcadia Architectural Products, Inc., 60 Bonner Street, Stamford, CT. 203-316-8000, fax 203-316-8200
  - 2. Or Approved equal.

#### 2.02 WINDOWS PERFORMANCE REQUIREMENTS

- A. General: Provide fenestration systems capable of complying with performance requirements indicated, based on testing of manufacturer's fenestration systems that are representative of those specified and that are of size indicated.
- B. Manufacturer of Fenestration systems shall comply with ASTM-E331 for water infiltration, ASTM-E283 for air infiltration, ASTM-E330 for structural performance, requirements indicated in AAMA/NWDA/101/1.S.2 for type, grade, and performance class of fenestration required and as to meet the design criteria indicated in this Specification and on the Project Drawings.
  - 1. Fenestration system components to allow for expansion and contraction caused by a cycling temperature range of 180 degrees F without causing detrimental effects to fenestration components, anchorages, other building elements and weather tightness.

2. Design and size members to withstand dead and live, and environmental loads caused by pressure and suction of wind as calculated in accordance with Washington Building Code, Current Edition.
  3. Water entering Joints, condensation occurring in glazing channels, or migrating moisture occurring within fenestration system, shall promptly, and thoroughly drain to the exterior.
- C. Certifications:
1. Provide fenestration units independently tested and certified for air infiltration, water penetration, and structural performance by AAMA, for thermal transmission and solar heat gain performance by NFRC, and insulating glass certified by ASTM E774. Provide testing data for water penetration with air vents open and air vents closed.
  2. Manufacturer shall provide written certification that fenestration assembly has been tested in the configuration that it will be installed in the field, and meets water penetration resistance requirements, per this Section.
- D. Thermal Transmittance: NFRC 100 maximum whole unit U-factor per project documents<sup>[RS7]</sup>
- E. Solar Heat Gain Coefficient (SHGC): NFRC 200 maximum whole unit SHGC per project documents<sup>[RS8]</sup>
- F. Condensation Resistance Factor (CRF): Provide aluminum fenestration systems tested for thermal performance according to AAMA 1503, showing a CRF of 63 at frame and 56 at glass.
- G. Thermal Movements: Provide aluminum fenestration, including anchorage, that allow for thermal movements resulting from the following maximum change (rang) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change: 120 deg F ambient; 180 deg F material surfaces.

## 2.03 ALUMINUM FRAMED SLIDING DOOR SYSTEM

- A. Sliding door and Ribbon wall:
1. For use at Ray Williamson Pool, Natatorium area as depicted in the Project Drawings.
  2. Approved Basis of Design Products:
    - a. Arcadia 5000 Series Thermal Heavy Commercial Sliding Doors
    - b. Or Approved Equal.
  3. Operating Types:
    - a. OXXO

## 2.04 MATERIALS

- A. All doors shall be fabricated from aluminum extrusions of 6063-T5 alloy and temper with a minimum wall thickness of 0.100" for the sill member and a minimum of 0.072" for all other

- members, including frame, sash and optional sash dividers. The aluminum shall be free of defects which impair strength and appearance.
- B. Component parts and accessories shall be of aluminum alloy, stainless steel or non-metallic materials, which will neither deteriorate nor promote corrosion.
  - C. The thermal break barrier shall provide a thermal separation throughout the perimeter of the frame and sash. The thermal barrier shall be continuous and consist of a low thermal conductive material (polyurethane) poured into a special pocket in the aluminum extrusion that cures hard and strong. The underside of this pocket is then fully “de-bridged” or ripped so as to separate the connected aluminum wall leaving the polyurethane as the only bond between the outside and inside walls of the extrusion. In some instances the underside of this pocket is partially removed in a skipping pattern where every 18-20” of aluminum is fully debridged and in between, a 1-2” bridge in the aluminum remains. This is called “Skip Debridging”. Either method constitutes a “Thermally Broken Product”.
  - D. Sill shall have a full-length roll-formed 0.025” thick, stainless steel track cap.
  - E. Operable sash shall be equipped with two steel tandem ball bearing (all stainless steel tandem rollers and housings optional).
  - F. Locking device Adams-Rite maximum security lock MS+1850 with stainless steel hook bolt standard. Fully Stainless Steel MS 1950 lock available as an option.
  - G. Operating panels shall have an extruded 3/4” diameter 8” O.C. aluminum wire pull handle set in black anodize finish – other colors available.
  - H. Fixed and/or sliding sash members shall be constructed to allow for either factory or field glazing. Sash glazing shall be accomplished using a “marine” style reusable, wraparound black flexible PVC or EPDM material per commercial standard CS230-60 without the need for separate glazing beads or putty style bedding compounds. The glazing channel shall be provided with the unit for 1” insulating glass.
  - I. All assembly and installation screws shall be 18-8 or 410 stainless steel.
  - J. Screens made of extruded aluminum frame and screened with 18 x 16 fiberglass mesh.

## 2.05 GLAZING

- A. Glass and Glazing: Manufacturer’s standard glazing system that produces weather tight seal.
  - 1. Glass: ASTM C1036, Type I, q3, Category II Safety glass complying with testing requirements in 16 CFR 1201.
  - 2. Safety Glazing Labeling: Permanently mark safety glazing with certification label of the SHGC or the manufacturer. Label shall indicate manufacturer’s name, type of glass, thickness, and safety glazing standard with which glass complies.
  - 3. Insulating-Glass Units: ASTM E 2190
    - a. Maximum U-value as required to meet the overall window U-value including glazing and frame listed in the current version of the Washington State Energy Code.

- b. Filling: Fill space between glass lites with argon as required to meet overall window U-value.
- c. Spacer: Extruded thermoplastic butyl with integrated desiccant.
- d. Glazing Gaskets: Gaskets shall be of material and design compatible with adjacent materials and coatings and to neither degrade nor promote corrosion of adjacent Aluminum or other components.
  - (1) "Marine" Style reusable, wraparound black flexible PVC or EPDM material per commercial standard CS2323-60 without the need for separate glazing beads or putty style bedding compounds.
  - (2) Glazing channel for 1" insulated glass<sup>[RS9]</sup>

## 2.06 FINISHES

- A. Finish all exposed areas of aluminum and components as indicated.
  - 1. Fluorocarbon Coating: AAMA 2605.
    - a. Resin: 70% PVDF Kynar 500/Hylar 5000.
    - b. Substrate: cleaned and pretreated with chromium phosphate.
    - c. Primer: Manufacturer's standard resin base compatible coating. Dry film thickness.
      - 1) Extrusion: Minimum 0.20 mil.
    - d. Color Coat: 70% PVDF, dry film thickness.
      - 1) Extrusion: 1.0 mil.
    - e. Color:
      - 1) Dark Bronze
    - f. Acceptable Coatings Manufacturers:
      - 1) PPG Industries, Inc.
      - 2) Valspar Corporation

## 2.07 ACCESSORIES

- A. Fasteners, screws, and internal components: aluminum alloy, stainless steel, or non-metallic materials, which will neither deteriorate nor promote corrosion.
- B. Sheet Metal Flashing: Provide and install sill flashing L-metal back dams at sills and head flashings both with fully watertight soldered end dams for fenestration as depicted in Project Drawings.
- C. Shims: Provide and install shims as depicted in Project Drawings and as required by manufacturer. Shims shall be non-compressible inorganic composite shims suitably sized to fit the application.
- D. Sealant and Backer Rod:
  - 1. Provide and install sealant and backer rod at interior air and water seal and exterior perimeter joints as show in Project Drawings, and as specified in Section 07 92 00-Sealants.
  - 2. Sealant Faces: Where extrusion frame shapes do not provide a continuous, watertight flat surface for bonding of sealant joints for exterior or interior air and water seals at jambs and head, provide and install inserts also called caulk stops,

manufactured and provided by fenestration system manufacturer for that purpose and for use with the fenestration system.

- E. Rough Opening Flashing:
  - 1. General: Provide and install reinforced flexible membrane rough opening flashing and stainless steel back dams as shown in Project Drawings, and as specified in this and other Specification Sections.

### PART 3 – EXECUTION

#### 3.01 EXAMINATION

- A. Inspect fenestration rough openings, substrates, framing members, anchorage, and related conditions, with the Installer and the Installer's foreperson present, for compliance with requirements for installation tolerances before beginning installation. Verify that rough opening size is correct and will accommodate fenestration unit and all associated flashing and components, and adhere to manufacturer's recommendations. Examine rough opening for: level, plumb, and square rough opening, and without twist.
- B. Modify rough opening per Project Details to accommodate associated sheet metal flashings and trim.
- C. Examine wall flashings, water and weather barriers, and other built-in components to ensure a coordinated, watertight aluminum framed storefront installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 1. Start of installation of fenestration system shall indicate that the Installer finds conditions of the rough opening, rough opening flashing, substrates, and framing members to be suitable for successful fenestration installation per Project Documents and Manufacturer's requirements.

#### 3.02 PREPARATION

- A. Prior to installation of fenestration system, protect fenestration, wood, concrete, plaster, and gypsum substrates from weather, moisture, and damage. Install water-resistive barrier system and membrane and sheet metal flashing to clean, dry substrates.
- B. Fully protect installed fenestration from damage during construction and prior to building completion and turn-over.
- C. Prior to installation, remove all adhesive labels and contaminants from frames to ensure full-adhesion of flashing and sealant.

#### 3.03 INSTALLATION

- A. General: Comply with Manufacturer's recommendations, Drawings, and Approved Shop Drawings for installation of fenestration, hardware, rough openings flashing, and other components.

- B. Install fenestration plumb, level, and true to line, without twist, warp or rack of frames or sash. Anchor securely in place. Maintain alignment with adjacent work. Secure assembly to frame opening without distortion or stress.
- C. Install fenestration for proper, easy operation, and leak-free fully weather-tight and secure performance.
- D. Coordinate installation with rough opening and exterior wall flashing and other components of the work. See Drawings for fenestration installation and flashing details prior to fenestration installation.
- E. Do not install fenestration units in rough opening if flashing is damaged. Correct fenestration rough opening flashing prior to unit installation
- F. Install fenestration, and components to drain condensation, water penetrating joints, and moisture migrating within fenestration to exterior.
- G. Set sill members in bed of sealant or with gaskets, as indicated, to provide weather tight installation.
- H. Separate Aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials according to ASTM E 2112 Section 5.12 “Dissimilar Materials.”
- I. Rough Opening Flashing: Prior to installation of fenestration, flash fenestration rough opening per Project Drawings for fully leak-free and watertight performance of the installed fenestration assembly.
- J. Attach new fenestration per Manufacturer’s written recommendations and Structural Engineer Approved Shop Drawings. Do not place fasteners through rough opening flashing at horizontal surface of sill.
- K. Exterior Sealant Joints: Install properly backed sealant joints at exterior fenestration as shown in Project Drawings.
  - 1. Install backer rod between fenestration frame and membrane flashed rough opening framing. Where sufficient clearance does not exist to install back rod, install bond breaker tape as specified in Section 07 92 00 – Joint Sealants.
  - 2. Install sealant joint at fenestration perimeter per Section 07 92 00 – Joint Sealants. Ensure joint is continuous and watertight. Allow no air leakage around the fenestration.
- L. Interior Perimeter Air Seal: Install continuous sealant joint at interior perimeter of fenestration.
  - 1. Install backer rod between fenestration frame and rough opening flashing.
  - 2. Install continuous sealant joint at fenestration perimeter. Ensure that joint is continuous, watertight, and does not allow air leakage around the fenestration.

### 3.04 TOLERANCES

- A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft (1.5 mm/m) non-cumulative or 1/8 inches per 8 ft (3 mm/3 m), whichever is less.

### 3.05 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.
- B. Repair or replace fenestration components that have failed designated field testing, and retest to verify performance complies with specified requirements.

### 3.06 CLEANING

- A. Refer to Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Lubricate hardware and moving parts.
- C. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weather tight closure.
- D. Adjust hardware for proper alignment, smooth operation, and proper latching without unnecessary force or excessive clearance.
- E. Clean exposed surfaces immediately after installing fenestration. Prevent damage to protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
  - 1. Keep protective films and covering in place until final cleaning.
- F. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.[RS10]
- G. Protect fenestration surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact fenestration surfaces, remove contaminants immediately according to manufacturer's written instructions.
- H. Replace units when repair is unsatisfactory to the Consultant or Owner, or is impractical.

### 3.07 SCHEDULE

Type C: (2) 18'0 x 8'0" (verify in field); Factory Glazed, OXXO system

END OF SECTION

## PART 1 – GENERAL

### 1.01 RELATED DOCUMENTS

- A. Project Drawings and general provisions of the Construction Contract, including General and Supplementary Conditions, Division 01 Specification Sections and bidding requirements, apply to the work of this Section.
- B. Technical publications, standards, and reference documents as outlined in individual Technical Specification Sections and as indicated on the Project Drawings.

### 1.02 SUMMARY

- A. General: Furnish all labor, materials, equipment, and services necessary and incidental to execution and completion of removal of existing fenestration system and installation of new, exterior and interior Aluminum Framed fenestration systems according to the Contract Documents, this Section, and the Project Drawings where indicated. Installation shall coordinate with fenestration rough opening flashings, sealants, and shall be long-term weather proof, with all associated accessories as necessary for thorough water-tight and weather-proof installation of new extruded aluminum fenestration.
- B. Section Includes, aluminum framed glass storefront fenestration and entrance door systems at Ray Williamson Pool Natatorium area scheduled for removal and replacement.
- C. Aluminum-Framed Storefront
  - 1. Arcadia, Inc., AG451T Series, 2" x 4-1/2" Thermally broken; center glazed system, screw spline, shear block, compensating stick or punched opening fabrication for 1" glass. At exterior.
  - 2. Arcadia, Inc., AR450 Series, 2" x 4½" Non-Thermal; center glazed, screw spline, shear block, compensating stick or punched opening fabrication for ¼" glass. At Interior.
  - 3. Arcadia, Inc., MS362 Series, Medium Stile Door 1-3/4". At exterior and interior.
- D. Related Sections:
  - 1. Divisions 00 and 01 – All related Sections
  - 2. Section 02 41 19 - Selective Demolition
  - 3. Section 06 10 00 – Rough Carpentry
  - 4. Section 07 92 00 – Joint Sealants
  - 5. Section 08 32 13 Aluminum Framed Sliding Glass Door
  - 6. Section 08 80 00 – Glazing

### 1.03 BENCHMARK REFERENCES AND STANDARDS

- A. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. 2018 International Building code (IBC), as amended by the State of Washington
  - 2. 2018 Washington State Energy code.
- B. ASTM-American Society for Testing and Materials:

1. ASTM E 283-04 “Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors.”
  2. ASTM E330-02 “Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.”
  3. ASTM E 547 “Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.”
  4. ASTM G85 Modified Salt Spray (Fog) Testing.
  5. ASTM E774-00 “Specification for Sealant Insulating Glass Units.”
  6. ASTM E-1886-02 “Standard for Testing Windows and Doors for Cyclic Wind {ressires.”
  7. ASTM E 1996-02 “Standards for Testing Windows and Doors for Windborne Debris (large Missile and small Missile).”
  8. ASTM C1193, Standard Guide for Use of Joint Sealants.
  9. ASTM E241, Standard Guide for Limiting Water Induced Damage of Buildings.
- C. AAMA- America Architectural Manufacturers Association:
1. AAMA /NWWDA 101/ I.S.2-97 “Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.”
  2. AAMA 503-03 “Voluntary Specification for Field Testing of Windows and Sliding Glass Doors. “No reduction allowed.
  3. AAMA 611-98 “Voluntary Specification for Anodized Architectural Aluminum.”
  4. AAMA 701-00 “Voluntary Specification for Pile Weather Stripping.”
  5. AAMA 800-92 “Voluntary Specification for Test Methods for Sealants,”
  6. AAMA 906-96 “Voluntary Specification for Sliding Glass Door Roller Assemblies.”
  7. AAMA 1503-98 “Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, and Doors, and Glazed Wall Sections.”

D. AA – Aluminum Association

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meeting: Convene before starting work of this section. Conduct conference at Project site with location as mutually agreed by owner’s Project manager, General Contractor, Project Architect.
- B. Purpose and Agenda
1. Before the scheduled commencement of the Aluminum Framed storefront/ Entrance fenestration installation and associated flashing work, the Fenestration Installation Subcontractor, and related subcontractors (e.g., sheet metal subcontractors, etc.), and lead installers (foreperson) of each component of associated work, and other work in and around fenestration installation which must precede or follow fenestration installation shall attend a pre-Installation conference.
  2. The meeting shall be conducted by the General Contractor and shall be attended by the Project Architect, Aluminum Fenestration Installation Subcontractor, and other directly concerned with the installation of the materials and performance of the Work including Aluminum Fenestration Manufacturer(s), other subcontractors, insurers, test agencies, and governing authorities. After the meeting, the Architect will furnish Pre-Installation Meeting Minutes to the parties in attendance. At the meeting, the group shall review

the materials specified and procedures related to the Fenestration Installation Work, including but not necessarily limited to the following:

- a. Review requirements of Project Documents (Including Specifications and Drawings) as part of the Contract and submittals (both completed and yet to be submitted)
- b. Review governing regulations and requirements for insurance, bonding, and certification. General safety and fall protection plans shall be described by the General Contractor. The consultants will explain project monitoring and testing as may be applicable.
- c. Review Project Abatement Consultant's abatement requirements to ensure all abatement, containment, cleanup, and safety precautions are followed at all areas where asbestos containing, lead paint, or other hazardous materials are known, discovered, or suspected.
- d. Review and finalize the General Contractor's Preliminary construction schedule related to fenestration Installation work, including the General Contractor's plan for coordination or the work of the various trades involved, and other items/ events impacting the Work. The contractor shall furnish a quality control plan for the Aluminum fenestration installation, including protection measures for the stored materials, installed components, property, building, and grounds, etc.
- e. Review material(s) availability and the procurement of materials(s) and equipment yet to be delivered, material and equipment storage locations, and facilities needed to make continuous progress and avoid delays.
- f. Review the Aluminum Fenestration installation subcontractor's supervisory and lead personnel, including cell phone numbers and emergency contact information. Equipment, power needs, any temporary facilities required for continuous Work progress and avoidance of delays will also be reviewed.
- g. Review, discuss, and coordinate the interrelationship of Aluminum fenestration with other exterior wall components. Include provisions for anchoring, flashing, weeping, sealing perimeters, and protecting finishes.
- h. Review and discuss the sequence of work required to construct a watertight and weather-tight exterior building envelope.
- i. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.
- j. Review Aluminum fenestration system and building protection requirements for construction period extending beyond fenestration installation, through final clean-up and removal of all construction materials, demolished materials, and surplus materials, and review requirements for leak free terminations and tie-offs.
- k. Tour representative areas of the building, review and discuss scope of work for Aluminum fenestration installation, and related work. As well as other preparatory work that may be performed by other trades.
- l. Review weather and forecast weather conditions, and discuss protection and procedures for coping with unfavorable conditions, emergencies, and other potential circumstances including possibility of temporary protection of buildings.

#### 1.05 SUBMITTALS

- A. See Section 01 33 10 Submittals, for submittal procedures.

- B. Installation of fenestration shall not commence until complete submittal package for storefronts are reviewed and approved by the Project Architect.
- C. Product Data: Submit Manufacturer's descriptive technical literature, data sheets, and installation instructions, including but not limited to:
  - 1. Provide clear technical information regarding model numbers, series numbers, types, sizes, all accessories, and all other pertinent information
  - 2. Construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, and operating instructions for each type of storefront indicated.
  - 3. Submit color of Aluminum frame for review and approval by Owner, and Architect.
  - 4. Licensed Structural Engineer stamped wind design pressure calculations indicating fenestration units and their attachment to building meet International Building Code Requirements.
- D. Shop Drawings: Include plans, elevations, sections, details, hardware, accessories, attachment to other Work, and operational clearances. Include dimensions, relations to construction of adjacent work, air seal and weather seal to adjacent construction, component anchorage/ fastenings and locations, anchor/ fastening intervals, flashing details, methods and materials, and hardware details. Specifically include the following:
  - 1. Fastening requirements, anchorage requirements, and rough opening requirement. Attachment details.
  - 2. Mullion details, including integral reinforcement and stiffeners.
  - 3. Fenestration schedule
  - 4. Joinery Details
  - 5. Weather stripping and gasketing details.
  - 6. Fenestration rough opening flashing, sheet metal sill and head flashing, and associated flexible flashings.
  - 7. Written certificate verifying specified flashing and sill pan is acceptable to Fenestration Manufacturer and will not negatively impact the Manufacturer's warranty.
  - 8. Thermal break details
  - 9. Glazing details.
  - 10. Stops, fasteners, and all other accessories
- E. Samples for Verification:
  - 1. Fenestration corner sample
  - 2. Consultant reserves the right to require additional samples that show fabrication techniques, workmanship, and design or hardware and accessories
  - 3. Exposed finishes: 2" by 4" in color and finish selected by Owner/ Architect.
  - 4. Exposed Hardware: Full Size units.

#### 1.06 QUALITY CONTROL

- A. Contractor Requirements:
  - 1. Contractor shall provide experienced supervisors (i.e., Superintendent and Foreperson) and personnel (i.e., crew) to perform the work, who are trained in the application of the materials and procedures specified in this Specification. Contractor shall provide documentation from the Manufacturer that the contractor meets experience and

training requirement for the specified system. Contractor shall maintain on-site supervision continuously to assure on going quality control for superior quality application.

2. Contractor must have minimum five (5) years experience and specialize in installing Aluminum framed fenestration.
3. The contractor shall be responsible for the quality control of all of their own work, as well as the work performed by the subcontractors working under this Specification, and/ or related specification which is considered part of the Project Contract.
4. Contractor shall notify the Architect/ Consultant of any conflicts that may result in a deviation from the Manufacturer's Specifications, Industry standards, code compliance, job safety, or function as a result of the Project scope of Work, Specifications, and/ or Project Drawings.
5. If the Architect, Consultant and/ or Specified Manufacturer determine that the quality of work does not conform to the Specifications, and Project drawings, and /or Manufacturer's requirements, as well as Industry Standards, the Contractor must correct all deficiencies and advise the Architect Consultant and Manufacturer of the corrective actions taken.
6. Contractor must demonstrate the ability to perform the work in a quality, timely manner with minimum noise and disruption to or impact on Owners, Guests, Employees, Patrons, and the Public.
7. No modification to the Specifications, Project Drawings or substitutions of specified products shall be made without direct approval by the Project Architect. Contractor shall provide consultant with a written request for review and potential approval.

#### 1.07 SYSTEM DESCRIPTION

- A. General: In addition to requirements shown or specified, comply with:
  1. Applicable provisions of AAMA Aluminum Storefront and Entrance Manual for design, materials, fabrication and installation of component parts.
- B. Design Requirements:
  1. Arcadia AG451T Series is a framing system that provides for flush glazing on all sides without projected stops, with glass in the center of the frame. Framing system suitable for outside or inside glazing.
  2. Arcadia AR450 Series is a framing system suitable for outside or inside glazing.
  3. Arcadia MS362 Series Medium Stile Entrance is a single source package of door, doorframe and hardware that is engineered for moderate to high traffic.
- C. Performance Requirements:
  1. Limit air leakage through assembly to 0.06 CFM/min/sq. ft. (.00003 m<sup>3</sup>/sm<sup>2</sup>) of wall area at 6.24 PSF (300 Pa) as measured in accordance with ASTM E283.
  2. Water Resistance: No water leakage when measured in accordance with ASTM E331 with a static test pressure of 8 PSF(383 Pa) for AG451T and 10 PSF(480 Pa) for AR450.
  3. Limit mullion windload deflection of L/175 with full recovery of glazing materials, when measured in accordance with ASTM E 330.
  4. System shall not deflect more than 1/8" at the center point, or 1/16" at the center point of a horizontal member, once deadload points have been established.

5. System shall accommodate expansion and contraction movement due to surface temperature differential of 180 degrees F.
6. Seismic testing shall conform to AAMA recommended static test method for evaluating performance of curtain walls and storefront wall systems due to horizontal displacements associated with seismic movements and building sway.
7. Thermal Performance – When tested in accordance with AAMA 1503.1 the following results should be attained: U-Maximum .63/CRF – minimum of 59.
8. National Fenestration Rating Council (NFRC) specific application evaluation.
9. Each assembly tested by a recognized testing laboratory or agency in accordance with specified test methods.
  - a. Tested by the dual moment corner joint strength test.

#### 1.08 QUALITY ASSURANCE

- A. The General Contractor and Subcontractor shall be responsible for complete, watertight, and weatherproof building envelope systems and assemblies. The contractor shall establish and follow best practices for the trade and of quality-control and quality assurance to assure each and every building envelope systems successful completion.
- B. On-Site Observation: The Owner reserves the right to have the Consultant perform observation or monitoring of the flashings and fenestration installation. Such observation shall not relieve the Contractor of responsibility for proper execution and thorough completion of the work.
- C. Single Source Responsibility:
  1. Obtain entrances, storefronts, ribbon walls, window walls, curtain walls, window systems, and finish through one source from a single manufacturer.
  2. Provide test reports from AAMA accredited laboratories certifying the performances as specified in 1.07.

#### 1.09 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site undamaged in Manufacturer's or sales branch's original, unopened containers and packaging, with labels clearly identifying manufacturer and product name. Include installation instructions.
- B. Protect fenestration from moisture, construction traffic, and full sun. Store fenestration out of contact with ground, fully upright, and protected from wracking, bending, or other distortion and/ or breakage. Protect fenestration in well-ventilated and covered, dry area. Extruded aluminum framed fenestration systems shall be kept dry until installed and flashed. Handle fenestration to prevent damage to components and to finishes.
- C. Protect window sashes, glazing, frames, and extrusions. Replace units delivered with damaged frames or components. Units with damage to frames are not to be repaired and must be removed from the site and replaced with new.
- D. Protect fenestration from condensation; do not use non-vented plastic or other covering that causes condensation. Provide ¼". Space between units to promote air circulation.

#### 1.10 PROJECT AND ENVIRONMENTAL CONDITIONS

- A. Hazardous Materials: Prior to removal of existing fenestration or commencement of fenestration related work, ensure that all abatement procedures are executed in strict coordination with all activities.
- B. Field Measurements: The Contractor shall verify fenestration rough openings by field measurements before fabrication and indicate measurements on Shop Drawings. The Contractor shall provide the Project Team with a fenestration rough opening schedule that can be used for fenestration manufacture. Verify the size of each individual fenestration system rough opening to ensure the opening is adequate in size to accommodate the manufactured fenestration unit and all flashings and related components.
- C. Ensure substrates are clean, dry, fully prepared, and uncontaminated to allow full and successful bonding of flashing membrane and sealant. Do not install flashings and sealant to damp no wet substrates.
- D. Protect installed fenestration from construction, work of other trades, and weather and moisture, until fenestration are incorporated into complete weather resistive barrier and cladding and the Project is complete.

#### 1.11 WARRANTY

- A. System shall be warranted against failure and/or deterioration of metals due to manufacturing process for a period Warranty Period of:
  - 1. Fenestration Unit: 2 years from date of Substantial Completion.
  - 2. Glazing Units: 10 years from date of Substantial Completion.
  - 3. Aluminum Finish: 10 years from date of Substantial Completion.
- B. Contractor's Guarantee:
  - 1. Contractor shall guarantee that all fenestration are installed in accordance with the Project Documents, and will be free from defective workmanship and that the work will remain weatherproof with no premature defects for a period five (5) years from the date of substantial completion.

### PART 2 – PRODUCTS

#### 2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
  - 1. Basis of Design: Arcadia, Inc., 2301 E Vernon, Vernon, CA. Telephone:(323)269-7300
- B. Or approved equal.

#### 2.02 ALUMINUM FRAMED STOREFRONT SYSTEMS

- A. Storefront Fenestration:

1. For use at Ray Williamson Pool Natatorium area as depicted in the Project Drawings.
2. Approved Basis of Design Products:
  - a. Arcadia AG451T Series; 2" x 4 1/2" – exterior
  - b. Arcadia AR450 Series; 2" x 4 1/2" – interior
  - c. Arcadia MS362 Medium stile door; 1-3/4" – exterior and interior
    - 1) Vertical Stiles: 3-1/2 inches.
    - 2) Top Rail: 3-5/8 inches.
    - 3) Bottom Rail: 10/12 inches.
    - 4) Glazing Stops: Square snap-in type for 1 inch infill.
    - 5) Major portions of the door stiles a nominal .125 inches and glass stops .050 inches thick.
3. Or Approved equal.
4. Operating Types: Provide the following operating types in locations indicated on Drawings:

### 2.03 GLAZING

- A. Glass and Glazing: Manufacturer's standard glazing system that produces weathertight seal.
  1. Glass: ASTM C1036, Type I, q3, Category II Safety glass complying with testing requirements in 16 CFR 1201.
  2. Safety Glazing Labeling: Permanently mark safety glazing with certification label of the SHGC or the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
  3. Insulating-Glass Units: ASTM E 2190
    - a. Maximum U-value as required to meet the overall window U-value including glazing and frame listed in the current version of the Washington State Energy Code.
    - b. Filling: Fill space between glass lites with argon as required to meet overall window U-value.
    - c. Spacer: Extruded thermoplastic butyl with integrated desiccant.
    - d. 'Low-E Coating: Sputtered on second surface and fourth surface.
    - e. Glazing Gaskets: Gaskets shall be of material and design compatible with adjacent materials and coatings and to neither degrade nor promote corrosion of adjacent Aluminum or other components.
      - (1) Compression type design, replaceable, molded or extruded, or ethylene propylene diene monomer (EPDM).
      - (2) Shall be or type that locks securely into the glazing reglet to prevent glazing gaskets from disengaging.

### 2.04 FRAMING MATERIALS AND ACCESSORIES

- A. Framing members, transition members, mullions, adaptors, and mounting: Extruded 6063-T6 aluminum alloy (ASTM B221 – Alloy G.S. 10a T6).
- B. Screws, fastening devices, and internal components: Aluminum, stainless steel, or zinc-plated steel in accordance with ASTM.A-164. Perimeter anchors shall be aluminum or steel, providing the steel is properly isolated from aluminum.
- C. Glazing Gasket

1. Compression-type design, replaceable, molded or extruded, or ethylene propylene diene monomer (EPDM).
  2. Shall be of type that locks securely into the glazing reglet to prevent glazing gaskets from disengaging.
- D. Sealant and Backer Rod:
1. Provide and install sealant and backer rod at interior air and water seal and exterior perimeter joints as show in Project Drawings, and as specified in Section 07 92 00 - Sealants.
  2. Sealant Faces: Where extrusion frame shapes do not provide a continuous, watertight flat surface for bonding of sealant joints for exterior or interior air and water seals at jambs and head, provide and install inserts also called caulk stops, manufactured and provided by fenestration system manufacturer for that purpose and for use with the fenestration system.

## 2.05 FINISHES

- A. Finish all exposed areas of aluminum and components as indicated.
1. Fluorocarbon Coating: AAMA 2605.
    - a. Resin: 70% PVDF Kynar 500/Hylar 5000.
    - b. Substrate: cleaned and pretreated with chromium phosphate.
    - c. Primer: Manufacturer's standard resin base compatible coating. Dry film thickness.
      - 1) Extrusion: Minimum 0.20 mil.
    - d. Color Coat: 70% PVDF, dry film thickness.
      - 1) Extrusion: 1.0 mil.
    - e. Color:
      - 1) AR450 - Silver Grey
      - 2) AG451T – Dark Bronze
      - 3) MS362 Series - Silver Grey at interior double leaf; Dark Bronze at exterior single leaf.
    - f. Acceptable Coatings Manufacturers:
      - 1) PPG Industries, Inc.
      - 2) Valspar Corporation

## 2.06 HARDWARE

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. **Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process.** Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
- B. Entrance door hardware furnished and installed by the door manufacturer, and include the following standard hardware:
1. Hinge: Arcadia standard continuous hinge – Aluminum finish
  2. Door closer: Corbin Russwin Hardware (RU) - DC8000 Series or Norton Rixson (NO) - 7500 Series

3. Exit indicator: Arcadia exit indicator/ header sign – Aluminum finish
4. Lock: Arcadia Adams Rite MS + 1890 Deadlock/Latch Lock - Aluminum finish
5. Cylinder - Cylinder with interchangeable cores to match Owner standards.
6. Push/Pull hardware - Arcadia Radius Push/Pull Set.
7. Threshold: Extruded Aluminum with ribbed surface.
8. Sill Sweeps: Brush strip (concealed).
9. Panic Devices: (Cross, touch bar, flush mid panel.)

## 2.07 SYSTEM FABRICATION

- A. Continuous sub-sill shall be provided under sill members to collect water infiltration and divert from the interior of the system.
- B. Framing members shall be internally reinforced and secured at head and sill as necessary for structural performance requirements, for hardware attachment, and as indicated.
- C. Fasteners shall be so located as to ensure concealment from view in the final assembly.
- D. Stiles and rails shall be tubular sections accurately joined, flush and hairline at corners with heavy concealed reinforcement brackets secured with machine bolts, with optional MIG weld. Exposed screws not permitted.
- E. Each door leaf equipped with an adjusting mechanism, located in the top rail near the lock stile.
- F. Prepare internal reinforcement for door hardware.
- G. Custom hardware templates and physical hardware must be submitted prior to any fabrication.

## PART 3 – EXECUTION

### 3.01 EXAMINATION

- A. Inspect fenestration rough openings, substrates, framing members, anchorage, and related conditions, with the Installer and the Installer's foreperson present, for compliance with requirements for installation tolerances before beginning installation. Verify that rough opening size is correct and will accommodate fenestration unit and all associated flashing and components, and adhere to manufacturer's recommendations. Examine rough opening for: level, plumb, and square rough opening, and without twist.
- B. Examine wall flashings, water and weather barriers, and other built-in components to ensure a coordinated, watertight aluminum framed storefront installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
  1. Start of installation of fenestration system shall indicate that the Installer finds conditions of the rough opening, rough opening flashing, substrates, and framing

members to be suitable for successful fenestration installation per Project Documents and Manufacturer's requirements.

### 3.02 INSTALLATION

- A. General: Comply with Manufacturer's recommendations, Drawings, and Approved Shop Drawings for installation of fenestration, hardware, rough openings flashing, and other components.
- B. Install fenestration plumb, level, and true to line, without twist, warp or rack of frames or sash. Anchor securely in place. Maintain alignment with adjacent work. Secure assembly to frame opening without distortion or stress.
- C. Install fenestration for proper, easy operation, and leak-free fully weather-tight and secure performance.
- D. Set sill members in bed of sealant or with gaskets, as indicated, to provide weathertight installation.
- E. Rough Opening Flashing: Prior to installation of fenestration, flash fenestration rough opening per Project Drawings for fully leak-free and watertight performance of the installed fenestration assembly.
- F. Attach new fenestration per Manufacturer's written recommendations and Structural Engineer Approved Shop Drawings. Do not place fasteners through rough opening flashing at horizontal surface of sill.
- G. Exterior Sealant Joints: Install properly backed sealant joints at exterior fenestration as shown in Project Drawings.
  - 1. Install backer rod between fenestration frame and membrane flashed rough opening framing. Where sufficient clearance does not exist to install back rod, install bond breaker tape as specified in Section 07 92 00 – Joint Sealants.
  - 2. Install sealant joint at fenestration perimeter per Section 07 92 00 – Joint Sealants. Ensure joint is continuous and watertight. Allow no air leakage around the fenestration.
- H. Interior Perimeter Air Seal: Install continuous sealant joint at interior perimeter of fenestration.
  - 1. Install backer rod between fenestration frame and rough opening flashing.
  - 2. Install continuous sealant joint at fenestration perimeter. Ensure that joint is continuous, watertight, and does not allow air leakage around the fenestration.

### 3.03 TOLERANCES

- A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft (1.5 mm/m) non-cumulative or 1/8 inches per 8 ft (3 mm/3 m), whichever is less.

### 3.04 FIELD QUALITY CONTROL

- A. Test the Aluminum storefront for water leaks in accordance with AAMA 501.2. Conduct test in the presence of the Architect.
- B. Repair or replace fenestration components that have failed designated field testing, and retest to verify performance complies with specified requirements.

### 3.05 CLEANING

- A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weather tight closure.
- B. Adjust hardware for proper alignment, smooth operation, and proper latching without unnecessary force or excessive clearance.
- C. Clean exposed surfaces immediately after installing fenestration. Prevent damage to protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
  - 1. Keep protective films and covering in place until final cleaning.
- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- E. Protect fenestration surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact fenestration surfaces, remove contaminants immediately according to manufacturer's written instructions.
- F. Replace units when repair is unsatisfactory to the Consultant or Owner, or is impractical.

### SCHEDULE

Type A: (2) Door 1 and 4 - 3'0" x 7'0" (verify in field); Factory Glazed, Thermally broken operable glazed door

Type B: (4) 18'0" x 8'0" (verify in field); Factory Glazed, Fixed storefront

Type D: 18'0" x 9'0" (with Door 9 and 10 6'0" x 7'0" included) (verify in field); Factory Glazed, operable glazed doors and fixed storefront

END OF SECTION

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

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

### 1.02 SUMMARY

- A. This Section includes commercial door hardware for the following:
  - 1. Swinging doors.
  - 2. Sliding doors.
  - 3. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
  - 1. Mechanical door hardware.
  - 2. Cylinders specified for doors in other sections.
- C. Related Sections:
  - 1. Division 08 Section Hollow Metal Doors and Frames
  - 2. Division 08 Section Aluminum Storefronts
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
  - 2. ICC/IBC - International Building Code.
  - 3. NFPA 70 - National Electrical Code.
  - 4. NFPA 80 - Fire Doors and Windows.
  - 5. NFPA 101 - Life Safety Code.
  - 6. NFPA 105 - Installation of Smoke Door Assemblies.
  - 7. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
  - 1. ANSI/BHMA Certified Product Standards - A156 Series.
  - 2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
  - 3. ANSI/UL 294 - Access Control System Units.
  - 4. UL 305 - Panic Hardware.
  - 5. ANSI/UL 437- Key Locks.

### 1.03 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
  - 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
  - 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
  - 3. Content: Include the following information:
    - a. Type, style, function, size, label, hand, and finish of each door hardware item.
    - b. Manufacturer of each item.
    - c. Fastenings and other pertinent information.
    - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    - e. Explanation of abbreviations, symbols, and codes contained in schedule.
    - f. Mounting locations for door hardware.
    - g. Door and frame sizes and materials.
    - h. Warranty information for each product.
  - 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- D. Informational Submittals:
  - 1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

#### 1.04 QUALITY ASSURANCE

- A. **Manufacturers Qualifications:** Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. **Certified Products:** Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. **Installer Qualifications:** A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- D. **Door Hardware Supplier Qualifications:** Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- E. **Source Limitations:** Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
  - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
- F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.
- G. **Keying Conference:** Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
  - 1. Function of building, purpose of each area and degree of security required.
  - 2. Plans for existing and future key system expansion.
  - 3. Requirements for key control storage and software.
  - 4. Installation of permanent keys, cylinder cores and software.
  - 5. Address and requirements for delivery of keys.
- H. **Pre-Submittal Conference:** Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
  - 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment

of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.

2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
  3. Review sequence of operation narratives for each unique access controlled opening.
  4. Review and finalize construction schedule and verify availability of materials.
  5. Review the required inspecting, testing, commissioning, and demonstration procedures
- I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

#### 1.06 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

#### 1.07 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
  - 1. Structural failures including excessive deflection, cracking, or breakage.
  - 2. Faulty operation of the hardware.
  - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 4. Electrical component defects and failures within the systems operation.
- C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.01 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
  - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Please note that ASSA ABLOY is transitioning the Yale Commercial brand to ASSA ABLOY ACCENTRA. This affects only the brand name; the products and product numbers will remain unchanged. The brand transition is expected to be complete in or about May of 2024, and products shipping after that time will be branded ASSA ABLOY ACCENTRA.
- D. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

### 2.02 BUTT HINGES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
  - 1. Quantity: Provide the following hinge quantity:
    - a. Two Hinges: For doors with heights up to 60 inches.
    - b. Three Hinges: For doors with heights 61 to 90 inches.

- c. Four Hinges: For doors with heights 91 to 120 inches.
- d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
  - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
  - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
  - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
  - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
4. Hinge Options: Comply with the following:
  - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
5. Manufacturers:
  - a. McKinney (MK) - TA/T4A Series, 5-knuckle.

#### 2.03 DOOR OPERATING TRIM

- A. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
  1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
  2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
  3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
  4. Pulls, where applicable, shall be provided with a 10" clearance from the finished floor on the push side to accommodate wheelchair accessibility.
  5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
  6. Manufacturers:
    - a. Rockwood (RO).

#### 2.04 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
  1. Manufacturers:
    - a. Match Existing, Field Verify.

- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
  - 1. Threaded mortise cylinders with rings and cams to suit hardware application.
  - 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
  - 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
  - 4. Tubular deadlocks and other auxiliary locks.
  - 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
  - 6. Keyway: Manufacturer's Standard.
- C. Large Format Interchangeable Cores: Provide removable cores (LFIC) as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.
- D. Keying System: Each type of lock and cylinders to be factory keyed.
  - 1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
  - 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
  - 3. New System: Key locks to a new key system as directed by the Owner.
- E. Key Quantity: Provide the following minimum number of keys:
  - 1. Change Keys per Cylinder: Two (2)
  - 2. Master Keys (per Master Key Level/Group): Five (5).
  - 3. Construction Keys (where required): Ten (10).
- F. Construction Keying: Provide construction master keyed cylinders.
- G. Key Registration List (Bitting List):
  - 1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
  - 2. Provide transcript list in writing or electronic file as directed by the Owner.

## 2.05 MORTISE LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all functions and features as specified herein.
  - 1. Manufacturers:
    - a. Corbin Russwin Hardware (RU) – ML 2000 Series.
    - b. No substitutions.

## 2.06 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
  - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
  - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
  - 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
  - 4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
  
- B. Standards: Comply with the following:
  - 1. Strikes for Mortise Locks and Latches: BHMA A156.13.
  - 2. Strikes for Bored Locks and Latches: BHMA A156.2.
  - 3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
  - 4. Dustproof Strikes: BHMA A156.16.

## 2.07 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
  - 1. Exit devices shall have a five-year warranty.
  - 2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
  - 3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
  - 4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
  - 5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
  - 6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
    - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
  - 7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
  9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
  10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
  11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.
1. Manufacturers:
    - a. Corbin Russwin Hardware (RU) – ED5000 Series.
    - b. No substitutions.

## 2.08 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
  2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
  3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
  4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
  5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
  6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard..
1. Manufacturers:
    - a. Corbin Russwin Hardware (RU) - DC8000 Series.
    - b. Norton Rixson (NO) - 7500 Series.

## 2.09 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
  - a. Stainless Steel: 300 grade, 050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
  - a. Rockwood (RO).

2.10 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
  1. Manufacturers:
    - a. Rockwood (RO).

2.11 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
  1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
  - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
  - 1. Pemko (PE).

## 2.12 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

## 2.13 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

### 3.02 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

### 3.03 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
  - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
  - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  - 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
  - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
  - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

### 3.04 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

### 3.05 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

### 3.06 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

### 3.07 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

### 3.08 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
  1. Quantities listed are for each pair of doors, or for each single door.
  2. The supplier is responsible for handling and sizing all products.
  3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
  4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.
- B. Manufacturer's Abbreviations:
  1. MK – McKinney
  2. RU - Corbin Russwin

3. AD - Adams Rite
4. RO – Rockwood
5. PE – Pemko
6. SU - Securitron

**Hardware Sets**

**Set: 1.0**

Doors: 1, 2

3	Hinge, Full Mortise	TA2314 x NRP	US32D	MK
1	Entrance Lock	ML2054 PSA C6	630	RU
1	Surface Closer	7500	689	NO
1	Kick Plate	K1050 __X1.5LDW CSK BEV	US32D	RO
1	Wall Stop	409	US32D	RO
1	Gasketing	S44GR		PE