SECTION 02 80 13

HAZARDOUS BUILDING MATERIALS REMEDIATION

PART 1 - GENERAL

1.1 SUMMARY

A. In the event subbasement work needs to be performed, with approval from the City, the contractor shall hire an approved third-party consultant to survey the basement and develop a work plan for hazardous material abatement. The Contractor, with approval from the City shall hire a qualified abatement contractor to perform the abatement under the guidance of the work plan and third-party oversite.

B. Many of the materials and items of equipment used to construct the improvements and facilities at the Project Site contain materials known to the State of California to be either carcinogenic or reproductive toxins. Such hazards include but are not limited to asbestos-containing materials (that are not Naturally Occurring Asbestos), lead based paints, lead-containing materials and demolition associated with hazardous materials.

C. This Section includes hazardous and toxic materials precautions, general requirements, and handling procedures as required to the work and existing conditions of the project. This Section includes requirements and procedures to be performed by the Contractor for the handling, removal, abatement, remediation, transportation and disposal of hazardous building materials.

D. Hazardous materials removal shall be conducted as per the construction phasing and staging described as specified in the drawings

E. Payment: All work in this Section shall be done under Bid Item No. CS-6: CONTINGENCY ALLOWANCE FOR HAZARDOUS MATERIALS ABATEMENT.

1.2 RELATED DOCUMENTS AND SECTIONS

A. Section 00 31 00 Available Project Information

B. Section 01 41 00 Regulatory Requirements

C. Section 01 35 45 Health and Safety Criteria

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. E84: “Test Method for Surface Burning Characteristics of Building Materials.”

2. E849: “Safety and Health Requirements Relating to Occupational Exposure to Asbestos.”

3. E119: “Standard Method for Fire Tests of Building Construction and Materials”

B. American National Standards Institute (ANSI):

1. Z41.1: “Men’s Safety Toe Footwear.”

2. Z86.1: “Commodity Specification for Air.”

3. Z87.1: “Practice for Occupational and Educational Eye and Face Protection.”

4. Z89.1: “Requirements for Industrial Head Protection.”

5. Z9.2: “Fundamentals Governing the Design and Operation of Local Exhaust Systems”

6. Z88.2: “Practices for Respiratory Protection.”

7. Z88.6: “Respiratory Protection - Respiratory Use Physical Qualifications for Personnel.”

C. National Fire Protection Association (NFPA):

1. Standard 701: “Small Scale Fire Test for Flame Resistant Textiles and Films.”

2. Standard 10: “Fire Extinguishers.”

3. Standard 70: “National Electric Code.”

D. California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA):

1. Title 8 California Code of Regulations (8 CCR) Section 5144 - Respiratory Protection.

2. Title 8 California Code of Regulations (8 CCR) Section 1532.1 - Construction Lead Standard.

3. Title 8 California Code of Regulations (8 CCR), Article 4, Section 1529 - Asbestos Standard for the Construction Industry.

4. Title 8 California Code of Regulations (8 CCR) Sections 3203 and 1509 - Injury and Illness Prevention Program.

5. Title 8 California Code of Regulations (8 CCR), Article 110, Section 5208 - Asbestos Standard for General Industry.

6. Title 8 California Code of Regulations (8 CCR), Article 2.5, Section 341.6 for employer registration when disturbing more than 100 sq. ft. of ACCM.

7. Title 8 California Code of Regulations (8 CCR), Section 1537: Welding, Cutting, and Heating of Coated Materials.

E. California Department of Public Health Title 17 California Code of Regulations (17 CCR) Sections 35001-36100 for Accreditation, Certification, and Work Practices for Lead-based Paint and Lead Hazards.

F. U. S. Department of Housing and Urban Development (HUD): Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing,” referred to as the “HUD Guidelines.”

1.4 DEFINITIONS

A. Activity Class/Category - Lead: Lead hazard designations assigned to work activities that involve lead-containing materials. Activities, which fall into Classes 1 through 3, including as examples the operations defined below, are required to assume the following personal airborne exposure levels, unless otherwise demonstrated.

Lead Hazard Trigger Activities	Work Activity
Trigger Task, Activity 1 Exposure Less than 500 micrograms/m3	• Surface clean-up of lead-containing dust or debris less than 15,000 microgram/square feet • Spray painting with lead-based paints • Manual demolition of structures (e.g. drywall, plaster, etc.) • Manual sanding, grinding, needle gunning, chiseling, hammering, wire brushing, milling or scraping of lead-based coatings • Heat gun removal of surface coating power tool Power tool cleaning with dust collection system
Trigger Task, Activity 2 Exposure 500 micrograms/m3 or greater but less than 2500 micrograms/m3	• Using lead mortar • Lead burning • Rivet busting • Power tool cleaning without dust collection systems • Clean-up of dry abrasive • Abrasive blasting enclosure movement and removal
Trigger Task, Activity 3 Exposure 2,500 micrograms /m3 or greater	• Abrasive blasting of coated surfaces • Welding on coated surfaces • Torching or cutting of coated surfaces • Torch burning of coated surfaces

B. Asbestos Work Class: Activities for removing asbestos materials by categories as follows:

Asbestos Activity Class / Category	Work Activity
Work Class I	• Activity involving removal of Thermal System Insulation (TSI) and surfacing Asbestos-Containing Materials (ACM) or friable Presumed – Asbestos Containing Materials (PACM).
Work Class II	• Activity involving removal of ACM which is not TSI or surfacing material, including, but not limited to, wallboard, floor tiles and sheeting, roofing and siding shingles, naturally occurring asbestos (soil, rock, etc.) and construction mastics. Note also that Class II materials that cannot be removed intact, such as soil, require usage of respiratory protection at all times, regardless of personal monitoring data showing compliance to PEL and EL.
Work Class III	• Repair and maintenance operations where TSI or surfacing is likely to be disturbed, which fits within one standard glove bag or waste bag.
Work Class IV	• Maintenance and custodial activities during which employees contact but do not disturb PACM or ACM and activities to clean up dust, waste bag and debris resulting from Work Class I, II, and III activities.
Unclassified	• Any activities dealing with materials containing detectable but <1.0 % asbestos.

C. Certified Lead Worker: includes those who do lead-related construction work activities on a work site under the directions of a Certified Lead Supervisor, including:

1. Removal, disposal or abatement of loose and peeling lead-based paints as defined by CDPH, including scraping, demolition or other Cal/OSHA Activity 1 through 3 work as defined above.

2. Removal or repair of lead plumbing.

3. Repainting or general construction on surfaces painted with lead-based paints.

4. Removal, enclosing or covering of lead-contaminated soils.

5. Exemption: renovations, remodeling, painting, operations and maintenance work or other activities listed above that are considered to be interim controls, or lasting less than 20 years, may be completed by workers satisfying Cal/OSHA's asbestos awareness training requirements only.

D. Certified Lead Supervisor: includes those who supervise daily work activities on a lead-related construction site, as well as supervision of repainting or general construction performed on surfaces with lead-based paints where abatement is designed to permanently reduce or eliminate lead hazards for public (non-industrial) buildings or to last more than 20 years. The Certified Lead Supervisor shall oversee the Certified Lead Workers, enforce safe work practices, and schedule and coordinate work site activities with the building occupants and other contractors and consultants.

E. Containment: as defined by the California Department of Public Health includes any system, process or barrier used to contain lead hazards in a work area, including plastic sheeting, wet scraping, and other lead-safe work practices as described in the HUD Guidelines, Chapter 8.

F. Remediation: abatement, removal, control or containment of hazardous or toxic material(s).

1.5 SUBMITTALS

A. The Contractor or its hazardous materials abatement subcontractor shall submit copies of any notice of safety and environmental violations received from the regulatory agencies that they may have received in the last 20 years in the USA.

B. The Contractor or its hazardous materials abatement subcontractor shall submit copies all the Minimum Qualification licensing requirements asked for in Section 01 35 44 Hazardous Building Materials Scope of Work.

C. The Contractor or its hazardous materials abatement subcontractor shall submit proof of its five (5) years of hazardous materials abatement and/or removal experience asked for in Section 01 35 44 Hazardous Building Materials Scope of Work.

D. The Contractor or its hazardous materials abatement subcontractor shall submit proof of its environmental training requirements.

E. BAAQMD-issued Approval Letter for Asbestos Demolition. "[Job Number]". For all demolition of buildings and structures, regardless of whether asbestos is present or not, Contractor shall submit a copy of the BAAQMD-issued Approval Letter for Asbestos for Demolition, "*[Job Number]*" to the City Representative prior to the start of Demolition. To obtain this letter, Contractor shall submit an Asbestos Demolition Notification to the BAAQMD through their web-based Online Asbestos Notification System (http://learn.baaqmd.gov/course/view.php?id=4#section-5) **at least ten (10) business days prior to the start of any demolition.**

F. As per Section 01 33 00 – Submittal Procedures and Section 01 35 44 – Building Related Hazardous Materials Procedures, the Contractor shall submit a Hazardous Materials Management Plan (HMMP) with the following documentation listed below. The HMMP shall be submitted within (10) ten days after the Notice to Proceed and before commencement of demolition activities. **No hazardous materials work will start without the HMMP reviewed and approved by the City Representative.**

G. The Hazardous Materials Management Plan (HMMP) is the Contractor's comprehensive plan for the management of hazards encountered during the Work of this project. The HMMP is inclusive the following Plans:

1. An Asbestos Abatement Work Plan.
2. A Lead Hazard/Removal Control Plan.
3. A Waste Management Plan (WMP).
4. Information about the Contractor's designated Project Safety Representative (PSR) as per Section 01 35 45 Health and Safety Criteria. Include his/her training certification, qualifications; his/her name, phone number; fax number, and pager number.
5. Management spill procedures in the event of asbestos or any hazardous materials release or any event that may require modification or abridgment of site control and decontamination procedures.
6. Intended methods of compliance for hazardous materials handling work, including description of engineering controls, personal protective equipment as well as compliance monitoring as applicable.
7. Schedule and sequence of work for all hazardous materials work.
8. Worksite layout Diagram: Detailing location of each regulated area and construction of each containment identifying location of each decontamination units, fire extinguishers and emergency exits.
9. A copy of the Site-Specific Hazard Communication Plan in accordance with Federal and California OSHA requirements.
10. Copies of required licenses, certifications and notifications to handle and control hazardous materials.

H. As part of the Contractor's HMMP, the Contractor shall submit a Waste Management Plan (WMP). The WMP is the Contractor's comprehensive plan for waste management of hazardous and non-hazardous waste generated during the remediation work of this project. The WMP shall include the following:

1. Information about the designated persons who will implement the Plan. Include his/her name, phone number, and his/her roles and responsibilities for implementing the Plan.
2. Waste segregation procedures for waste generated from demolition debris, abatement, and stabilization.
3. Proposed location of locked dumpster, if applicable.
4. Sampling plan and protocol for waste characterization in accordance with 22 CCR §66262, ET. Seq.

5. Handling, segregation, and waste load-out procedures for hazardous and non-hazardous waste, including TSCA-regulated waste. Include diagrams showing regulated areas for waste segregation, load-out stations, paths of travel for off-hauls of waste, and engineering controls to prevent air pollution and potential exposures to airborne contaminants.

6. Waste hauler identification, information, 24-hour contact number, and copy of licenses.

7. Asbestos and lead waste disposal sites identification. Include name, address, 24-hour contact number.

I. For Asbestos Containing Construction Materials (ACCM), or Asbestos Containing Material (ACM), as applicable by regulation, and as part of the Hazardous Materials Management Plan (HMMP) the Contractor shall submit the following, but not limited to:

1. Asbestos Pre-job Submittals:

a. Proof of current asbestos contractor's license issued by the California Contractors' State License Board.

b. Proof of current California Department of Industrial Relations (CA-DOSH or Cal/OSHA) Asbestos Contractor's registration certification.

c. Valid and current Bay Area Air Quality Management District (BAAQMD) notification for the Project and (as applicable).

d. Cal/OSHA 24-hour notice per 8 CCR 1529.

e. Worker documentation, including:

1) Current AHERA training certification - supervisor/competent person

2) Current AHERA training certifications for workers.

3) Respiratory fit test records within past 12 months.

4) Annual medical examination approvals for respirator use.

f. Written Asbestos Abatement Work Plan and schedule with the sequence of work.

g. Safety Data sheets (SD) for all materials used.

h. Emergency phone numbers, pagers and email addresses.

i. Aerosol Challenge Testing Certification

1. Aerosol challenge testing using dioctylphthalate (DOP, also known as Bis(2-ethylhexyl) phthalate) or an approved alternative is required for all equipment fitted with High Efficiency Particulate Air (HEPA) filters including negative pressure units, air machines, fan units and vacuum cleaners.

2. Prior to use, testing must be performed on site:

a. Whenever equipment enters the site.

b. After replacement of HEPA filters or any other significant repairs or alterations.

3. Equipment which fails testing shall be marked and promptly removed from the site.

4. Equipment which has passed testing shall be marked with a unique identifier number and the date of the testing. The identifier number shall be reflected on all testing documentation.

5. Recognized alternatives to DOP include, but are not limited to 4 centistoke (4 cSt) viscosity grade polyalphaolefin (POA) fluids such as Emery 3004 POA and selected mineral oils. Testing equipment modification and/or recalibration may be needed to use DOP alternatives.

j. Rotameter calibration data calibrated by a primary standard within past 6 months.

2. Periodic Submittals: Submitted upon request during abatement:

a. Contractor's personal air monitoring results (daily)

b. Updated workers documentation (as needed)

c. Daily boundary access logs

d. Daily negative pressure manometer records (print outs), as applicable

e. Copies of updated schedules and notices to the regulatory agencies (as needed)

3. Project Closeout Submittals: Within 5 calendar days upon the City's request or within 5 calendar days after completion of the abatement or hazard control work, the Contractor shall submit the following:

a. Copies of updated schedules and notices to regulatory agencies, as needed.

b. Receipt and weight tickets from landfill operator or incinerator, as applicable.

c. Copies of completed uniform waste manifests.

d. Certification of Completion.

J. For Lead - Related Work, and as part of the Hazardous Materials Management Plan (HMMP) the Contractor shall submit the following, but not limited to:

1. Pre-job Submittals: The Contractor shall submit documents pertaining, but not limited to, the following

a. San Francisco Department of Building Inspections (DBI) notification and posting requirements as deemed required for exterior paint remediation.

b. Cal/OSHA notifications as per 8 CCR 1532.1

2. Workers documentation:

a. Current CDPH lead contractor/supervisor training certificates.

b. Current lead awareness training certificates - workers or CDPH Certified Lead Workers Certificate, as appropriate.

c. Respiratory fit test records within past 6 months.

d. Annual Medical Examination approvals.

e. Blood lead tests within past 90 days.

3. Lead Hazard/Removal Control Plan pursuant to 8 CCR 1532.1: Procedures for minimizing and controlling the migration of lead from disturbance of lead-containing

materials including a written lead hazard or lead removal work plan and schedule with the sequence of work:

4. Project Close-out Submittals: Within 5 calendar days upon the City's request, or within 5 calendar days after completion of the abatement or hazard control work, the Contractor shall submit the following:
    a. Updated worker documentation, as needed.
    b. Contractor periodic personal air monitoring results.
    c. Receipt and weight tickets from landfill operator or recycler, as applicable.
    d. Waste profiling data (TCLP, WET, and other analytical data)

K. For Copper Chromate Arsenate (CCA) Treated Wood Related Work

1. As part of the Hazardous Materials Management Plan (HMMP), the Contractor shall submit the following, but not limited to:
    a. Identification of EPA-approved hazardous waste landfill disposal facility, or an EPA-approved solid waste disposal facility.
    b. Temporary storage plan.
2. Workers Documentation:
    a. Certification of the workers and supervisor's forty (40) hour HAZWOPER training in compliance with 40 CFR 1910.120.
    b. Medical examination approvals for respirator use within the past twelve (12) months, or in compliance with 8 CCR 5144.
    c. Respiratory fit test records within the past twelve (12) months minimum, or in compliance with 8 CCR 5144.
3. Within 5 calendar days upon the City's request or within 5 calendar days after completion of the abatement or hazard control work, the Contractor shall submit the completed manifest or evidence of shipment date, recycler, and quantities shipped.

L. For Fluorescent Light Tube Related Work

1. As part of the Hazardous Materials Management Plan (HMMP), the Contractor shall submit the following, but not limited to:
    a. Identification of EPA-approved recycler.
    b. Temporary storage plan.
2. Project Close-out Submittals: Within 5 calendar days upon the City Representative's request, or within 5 calendar days after completion of the abatement or hazard control work, the Contractor shall submit the completed manifest or evidence of shipment date, recycler, and quantities shipped.

1.6 QUALITY CONTROL

A. Meetings

1. Pre-Abatement Meeting: Prior to any removal of hazardous materials and upon the HMMP submittal approved, a meeting will be conducted at the City's discretion. The Contractor shall attend a pre-construction meeting with the City Representative, the City's Consultants, and other Subcontractors whose work may be affected. The meeting agenda shall include the following considerations:

    a. Weekly Meetings: At the City's option, abatement work extending over one week in length may require attendance of the Contractor at a weekly progress meeting. The purpose of this meeting is to review abatement and project scheduling, coordination with other trades, security and site-specific requirements.

    b. Start-Up Hazardous Materials Handler's Meeting: Prior to the beginning of on-site work, all hazardous materials handlers shall attend a pre-start-up safety meeting that addresses hazardous materials issues specific for the project.

    c. Review of the Specifications and Plans in detail related to the abatement and hazards control work. All conflicts and ambiguities, if any, shall be discussed.

    d. Review in detail the project conditions, schedule, construction sequencing, site protection, protection of historic building materials abatement application requirements, and quality of completed work.

    e. Review in detail the means of protecting adjoining areas; protection of Contractor's, Subcontractor's, City's workers, and completed work during the abatement and lead removal activities.

    f. Pre-job submittals requirements.

    g. Site security requirements.

B Field Quality Control Sampling

1. During all asbestos-related work, perimeter sample(s) will be collected by the City's Certified Industrial Hygienist or its Environmental Consultant (DOSH Certified Asbestos Consultant). These sample(s) will be analyzed by Phase Contrast Microscopy (PCM). Sample results that are in excess of the background level or 0.010 fibers per cubic centimeter (f/cc) Project Action Level may be forwarded for analysis by Transmission Electron Microscopy (TEM) with a 12-hour turnaround specified. Handling, shipping, and analysis charges (including the Environmental Consultants time and expenses) will be paid for by the Contractor. Any sample results in excess of 70 asbestos structures per square millimeter of filter area (corrected for a 1,200 - 1,800 liter sample volume as appropriate, or in excess of 0.018 str/cc, normalized to a 1,500-liter air sample) will require cleaning, inspection, and resampling of the affected area at the Contractor's expense.

2. During all lead-related work, such as demolition, torching and welding activities, etc., as applicable, visual inspections, perimeter air sample and/or lead wipe sample results will be collected by the City's Certified Industrial Hygienist or its Environmental Consultant (DOSH Certified Asbestos Consultant). These samples will be analyzed by flame atomic absorption.

C. Clearance and Re-occupancy Sampling

1. Asbestos Clearance Sampling

    a. Clearance samples will be collected by the City at the completion of the asbestos abatement activity. Clearance will be either by visual inspection and/or phase contrast microscopy (PCM) and/or aggressive air sampling - transmission electron microscopy (TEM). The City Representative reserves the right to

conduct AHERA clearance criteria and limit the number of samples for clearances to be less than AHERA protocol when the City's Representative deems appropriate.

b. Clearance air samples using aggressive air sampling techniques shall be collected for all abatement zones, unless otherwise designated in the Contract Documents.

c. Phase Contrast Microscopy (PCM) Clearances: Areas cleared by PCM shall show an airborne concentration of total fibers for each sample at or below 0.010 fibers per cubic centimeter (f/cc) using the NIOSH 7400A counting rules. Any sample result exceeding 0.010 fibers/cc shall require re-cleaning of the work area and retesting. The City Representative will determine the minimum number of samples, based on the quantity and types of materials removed configuration, and sequencing of the work areas, and similar considerations.

d. When transmission electron microscopy (TEM) clearances are conducted, as designated by the Contract Documents, analysis shall be by the method described in 40 CFR Part 763, Appendix A, Subpart E (AHERA), with an analysis turn-around time of 24 hours, unless otherwise designated by the City. Z-test requirements under the AHERA regulations shall **NOT** apply to this Project. The TEM clearance standard is 0.018 s/cc for **ALL** samples (equivalent to 70 s/mm^2 for a 1500-liter sample volume). The City Representative may opt to adjust the sample volume to prevent possible overloading of the samples from interference dusts (e.g., demolition, welding particulates), if so, the analytical sensitivity shall be at or below 0.005 s/cc, maintained by having adequate number of grids analyzed by the laboratory.

2. Lead Wipe Sampling

a. All areas with regular occupancy affected by disturbance, demolition or scraping of painted surfaces shall be cleared by wipe sampling. Lead wipe sampling will be collected immediately prior to area occupancy.

b. The City Representative will collect clearance wipe samples after approving the work area cleanliness based on visual inspection. The wipe samples will be collected from building surfaces, NOT from plastic sheeting or other temporary barriers. The Contractor shall re-clean the area if surface lead concentrations exceed any of the following HUD definitions for lead contaminated dust:

<10 micrograms/ft^2 for interior floors

<10 micrograms/ft^2 for interior horizontal surfaces other than floors

<100 micrograms/ft^2 for exterior floor and horizontal surfaces, window sills and troughs

c. All reoccupancy/clearances will be based on floors and any interior horizontal surfaces. Routine use of other levels is not expected and are for use only as determined by the City on a case by case basis. Areas that do not meet the HUD lead contaminated dust criteria shall continue to be cleaned by and at the Contractor's expense until the specified criteria is achieved. Only after passing re-occupancy clearance, shall the Contractor teardown the containment and demobilize.

d. Where lead remediation occur concurrently with asbestos remediation activities, the area may be cleared (in addition to the wipe samples) by aggressive air sampling, where airborne lead concentrations following the final visual inspection shall not exceed the EPA's NAAQS standard of 1.5 micrograms/m^3 as analyzed

by NIOSH method 7082 (flame atomic absorption) or 7105 (graphite furnace atomic absorption) or ICP/MS.

D. Final Clearance Criteria

1. The City will pay the cost of the final round of visual inspections, aggressive air sampling, and PCM and/or TEM analyses that will meet the asbestos abatement specification. All rounds of visual inspections, aggressive air sampling, and PCM and/or TEM analyses that fail to meet the contract criteria shall be borne by the Contractor. For the purpose of this paragraph, visual inspection includes the area isolation inspection, pre-encapsulation inspection, and final area clean-up inspection.

2. If wipe sampling for re-occupancy clearance fails the HUD lead contaminated dust criteria, the Contractor will be responsible for additional clean-up costs (including costs associated with delays in time, and costs for the oversight Consultant and the City, and at no additional cost to the City), until clearance is achieved.

3. The Contractor shall pay for all Environmental Consultant costs for delays in completion of work beyond the authorized schedule established by the City. Such charges shall include Consultant's observations and inspections, daily air monitoring, equipment, transportation and analysis charges. Such costs are estimated at $1,200 per day, exclusive of any costs associated with final clearance air testing. See the Liquidated Damages Section in the General Conditions for further requirements.

E. Inspections

1. Work Area Inspections: Inspections are required at the completions of the following job phases:

   a. Pre-cleaning Inspection(s)

   b. Work Area Preparation Inspection (Pre and post 24-hour hold times)

   c. Pre-Encapsulation Inspection

   d. Final Visual Inspection

   e. Waste Handling Inspection

2. The Contractor's Supervisor shall provide in writing a signed or initialed request for inspection to the City. Request all inspections at least 24 hours in advance of the time required; inspections shall be performed between the hours of 8:00 a.m. and 3:00 p.m., Monday through Friday, unless otherwise noted. Written requests may be waived, and verbal requests accepted for short-duration projects at the discretion of the City. Adequate lighting is to be provided by the Contractor.

3. Precede all inspection requests by an evaluation by the superintendent. The superintendent shall be a person who has not participated in the supervision, preparation, abatement, and cleanup of the work area, except on small-scale short-duration projects where the contractor's foreman may serve as the superintendent. The superintendent shall verify that criteria for acceptability have been met prior to requesting an inspection.

4. Pre-cleaning Inspection:

   a. The City Representative shall inspect all surfaces requiring pre-cleaning to verify that dust and debris have been removed and cleaned up to an acceptable condition. Multiple inspections may be required to cover all systems and the required phasing of activities.

b. No object shall be covered until inspected or approved by the City Representative as stated in the requirements herein. When covered before such inspections are made and approved, the Contractor shall uncover such work for inspection, subsequently restore it, and replace work of others damaged thereby, all at the Contractor's expense.

5. Work Area Preparation Inspection:

   a. After preparing the work area and decontamination enclosure system(s) for Activity Class I and II work areas, as applicable, the City's Representative shall conduct an initial inspection to ensure completeness of work and type containment according to the specifications.

   b. No hazardous material removal work shall commence without the approval of the City's Representative following a work area preparation inspection.

6. Pre-Encapsulation Inspection:

   a. After detail cleaning has been completed and the Superintendent has checked and approved the area as adequately cleaned, the City's Representative shall inspect all surfaces requiring encapsulation to verify that hazardous materials have been removed and the area and abated surfaces leaned to an acceptable condition.

   b. During such inspections, the Contractor will provide adequate lighting, ladders, scaffolding, workers, etc., so as not to curtail the systematic inspection of all surfaces by the City. Areas requiring rework will be tagged in a manner to allow continuation of the inspection in a timely manner. The City's Representative shall not be expected to remain within an area requiring extensive re-cleaning.

   c. The pre-encapsulation inspection may be staged to allow inspection of detailed surfaces concurrent with the removal activities in adjoining areas ready for inspection, allowing a buffer zone to protect against cross-contaminating inspected surfaces. For lead removal: a final overall inspection will be required to reconfirm the final wipe down of all horizontal surfaces, which may have been subjected to contamination from airborne releases during the staged inspection process. The staging of inspections shall not preclude the Contractor from conducting internal quality control inspections prior to requesting the City Representative's review.

7. Final Visual Inspection: After the encapsulation process is complete, the encapsulant is dry, and all debris bags, tools, supplies, and equipment have been removed from the work area, as applicable, City Representative shall inspect the work area to verify the cleanliness of the area, including but not limited to public and attic areas. The work area must be free of visible debris, dust, water, or loose and peeling lead-based paints as a minimum.

8. Waste Handling Inspection: The City Representative shall inspect waste as it leaves the regulated area. The Contractor shall insure that all waste is packaged, labeled, and handled as required. The City Representative may inspect the waste dumpsters at any time, including prior to transportation. Coordinate temporary relocation to a transport staging area with the City Representative prior to removal.

1.7 ADDITIONAL CONTRACT REQUIREMENTS

A. Specific mandatory asbestos abatement requirements for *occupied and unoccupied spaces* at San Francisco sites are more stringent than current regulations. This summary

of additional requirements is not to be read as a stand-alone document.

1. If work procedures are going to change, the City Representative must be notified, in writing, and given the opportunity to notify surrounding employees as the new procedures may impact surrounding areas (e.g., noise, vibration).

2. Localized occupants must be notified in writing of limited access to the work areas prior to the start of project.

3. The Contractor is responsible for coordinating with the City Representative and site facility representative as to where the exhaust air is to be directed and to ensure the exhausted air will not be recirculated within the facility prior to the initial setup of the work area.

4. A rigid and robust secondary perimeter with “Caution Construction” sign or equivalent. The secondary perimeter shall be a full height, 1-hour fire-rated, dust and sound proof construction barricade as per the architectural drawings for this project.

5. The regulatory signage is to be posted between the secondary construction perimeter and the regulated work area.

6. All equipment shall be inspected by the City’s designated representative prior to being brought on site. All equipment and supplies shall be free of dust and debris.

7. On-site aerosol challenge testing of negative air machines and HEPA vacuums prior to start of work and every 90 days for longer projects, when machines are relocated between floors. The aerosol challenge testing shall be conducted in the work area.

8. Sufficient quantities and types of dehumidifier units shall be installed and operated within the Construction Area to reduce humidity levels to 40% relative humidity.

9. Method of sealing critical barriers including the capping of ducts, supply registers, etc. shall be dust tight and capable of withstanding air flow and pressure generated by the ventilation system. Tape and/or polyethylene sheeting alone shall not be used to seal the supply registers.

10. Negative pressure differential of -0.04 inches of water with manometer reading records is required for all areas at all times during abatement and general construction activities. Downgrading of negative pressure during construction may be considered on a case by case basis.

11. The negative pressure enclosure shall maintain the minimum Negative pressure differential of -0.04 inches of water for at least 24 hours prior to the start of abatement unless otherwise approved by the City Representative. Following 24-hours, the City Representative and its Environmental Consultant will review the containments to determine if the integrity of the containments has been maintained. The Containment will have passed when the following 3 conditions are met:

    a. Containment integrity has been maintained for at least 24-hours; and

    b. Negative pressure has been maintained at least at -0.04” w.g. for 24-hours; and

    c. The City Representative and the Environmental Consultant are satisfied that the containment has been constructed sufficiently so as to last for at least two months without modifications, repairs or improvements

12. In negative pressure enclosures, a calculated air exchange rate of no less than 10 air exchanges per hour for the entire area in which the renovation activities are being performed.

13. Installation of clear, transparent view ports made of plastic or equivalent, in the polyethylene wall so that activities can be visually monitored from outside the containment. This window shall measure approximately 1' wide by 2' high. It shall remain transparent throughout the duration of the abatement process. It is recognized that viewing ports are not possible in all situations.

14. Adhesive tack (“sticky”) mats with multiple layers shall be installed at all construction barricade entrances to prevent tracking of construction dust outside of the construction area.

15. The removal of debris shall be in tightly covered containers, and only at times and routes approved by the City Representative and facility personnel.

16. All HEPA equipment, tools, decontamination chambers, etc. shall be clean upon entering the job site. Typically, the equipment and materials are inspected at a loading dock prior to bringing them into the facility. NOTE: The use of decontamination showers is limited to Class I work only unless otherwise specified by the Abatement Work Plan.

17. The Contractor is responsible for ensuring that water is properly shut off at lavatory/faucet fixtures at the beginning and ending of each shift. Project manager shall be immediately notified if the fixtures are unable to be completely shut off.

PART 2 - PRODUCTS

2.1 GENERAL

A. Prohibited Materials

1. Mastic or paint removers shall not result in the generation of hazardous waste.

2. Cleaning Agents, equipment, and methods employed shall not in any way damage the substrate or adjoining surfaces and finishes which are to remain. Cleaning solvents shall be non-injurious to the surfaces upon which they are applied. The methods used shall cause no pitting, erosion or damages to the surfaces.

3. Paint removal chemicals may not attach or leave deposits on the substrate material.

4. The following tools and equipment are specifically prohibited unless accepted in writing by the City Representative:

   a. High- or low-pressure water-blasting equipment for hosing of ductwork or work areas.

   b. Gasoline, propane, diesel or other fuel powered equipment inside the building.

5. Equipment that creates excessive noise or vibration that would affect safety of the building or its occupants or generate complaints from the occupants. Equipment shall not exceed an A-weighted sound level of 85 dB as measured at 50 ft. from the radiating source.

6. Asbestos-containing materials shall not be disturbed by cutting, sawing, grinding, pulverizing, crumbling, breaking, or otherwise rendered friable or airborne unless these activities are conducted under the requirements of all applicable regulations and guidelines by trained certified workers.

B. Minimum Requirements:

1. Deliver all materials in original packages, containers, or bundles bearing the names of the manufacturers and the brand names and details for proper storage and usage. Store all materials subject to damage off the ground, away from wet or damp surfaces, and under cover sufficient to prevent damage or contamination. Store materials so as not to interfere with the Owner's or other Contractors' operations.

2. Do not use damaged or deteriorating materials. Remove damaged materials from the premises. Dispose of contaminated materials in accordance with applicable regulations

2.2 MATERIALS AND EQUIPMENT

A. Protective Devices: Temporary wash stations or showers, disposable clothing, respirators, gloves, hard hats, and other required items. Respirators shall protect against appropriate dusts, fumes and mists as approved by the Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH) under provisions of 30 CFR Part 11.

B. Waste Receptacles: Conform to federal and State regulations, with 6-mil minimum thickness waste bags.

C. Polyethylene Sheeting and Dust Barriers

1. Polyethylene sheeting shall be flame-retardant and approved and listed by the State Fire Marshal in accordance with Section 13121 and/or 13144.1 of the California Health and Safety Code.

2. Thickness and Size: 6-mil thick minimum, unless otherwise specified, sized to minimize the frequency of joints.

3. Flammability: Comply with NFPA Standard 701 with a flame spread rating of no greater than 5 and a smoke development rating of no more than 70 when tested in accordance with ASTM accordance with ASTM E84 procedures.

D. Protective Devices to conform to the following:

1. Polyethylene drop cloths and dust barriers, temporary wash stations or showers, disposable clothing, respirators, gloves, hard hats, and other required items.

2. Respirators shall protect against asbestos and other appropriate dusts, fumes and mists as approved by the National Institute for Occupational Safety and Health (NIOSH) under provisions of 30 CRF Part 11.

E. Sealants:

1. Sealants shall, at a minimum, conform to the following:

a. Shall be Fire resistant

b. Shall be compatible with concrete, metals, wood, cable jacketing and other materials capable of preventing fire, smoke, water and toxic fumes from penetrating through sealants.

c. Shall be asbestos free and shall have a flame spread, smoke and fuel contribution of zero.

d. Shall be ASTM- and UL-rated for 3 hours for standard method of fire test for fire stop systems.

2. Spray adhesives shall not contain methylene chloride or methyl chloroform (1,1,1-trichloroethane) compounds.

3. Adhesive tape shall comply, at a minimum, with the following.

   a. Must be 2" or wider, shall be capable of sealing joints of adjacent sheet of polyethylene and attaching polyethylene sheet to finished or unfinished surfaces of similar materials.

   b. Tape shall be capable of adhering under dry and wet conditions, including use of amended water. Complete taping to critical or sensitive surfaces utilizing preservation sealing tape, such as:

      1) 3M Scotch Brand No. 4811 Preservation Tape; or

      2) 3M Scotch Brands No. 472 Plastic Film Tape.

F. Surfactants and Encapsulants:

1. Wetting agents or surfactants shall be effective and compatible with the ACM being wetted.

2. Bridging or penetrating type encapsulants shall have the following characteristics:

   a. Water based. Do not utilize an organic solvent in which the solid parts of the encapsulant are suspended.

   b. Non-flammable with no methylene chloride.

   c. U.L. listed encapsulants, in full-scale ASTM E119 fire test, compatible with W.R. Grace “Retroguard, RG-1” fireproofing with “Spatterkote” Type SKII” bonding treatment for structural and decking widths exceeding 24 inches.

   d. Compatible with replacement materials, especially mastics, fireproofing, and adhesives.

G. Mastic and Paint Removers to conform to the following:

1. Non-flammable solvent or gel, with a flash point above 140 degrees Fahrenheit.

2. Of low odor type.

3. Solvent waste shall not result in the generation of hazardous waste as described under 22 CCR, Division 4.

4. Removers shall NOT contain methylene chloride, halogenated hydrocarbons, or any of the following glycol ethers:

Common Name	Abbreviation	CAS #	Chemical Name
Ethylene glycol methyl ether	EGME	109-86-4	2 - methoxyethanol
Ethylene glycol methyl ether acetate	EGMEA	110-49-6	2- methoxyethyl acetate
Ethylene glycol ethyl ether	EGEEA	111-15-9	2- ethoxyethanol
Ethylene glycol dimethyl ether	EGDME	110-71-4	1,2-dimethoxyethane
Ethylene glycol diethyl ether	EGDEE	629-14-1	1,2 - diethoxyethane
Diethylene glycol	DEG	111-46-6	2,2 - dihydroxyethyl ether

Diethylene glycol methyl ether	DEGME	111-77-3	2-(2-methoxyethoxy) ethanol
Diethylene glycol ethyl ether	DEGEE	111-90-0	2-(2-ethoxyethoxy) ethanol
Diethylene glycol dimethyl ether	DEGDME	111-90-6	Bis-(2-methoxyethoxy) ether
Triethylene glycol dimethyl ether	TEGDME	112-49-2	2,5,8,11-tetraoxadodecane
Dipropylene glycol	DPG	110-98-5	2,2 - dihydroxyisopropyl

H. Vacuums and Negative Pressure Units (NPUs) used for cleanup of materials and detailing shall be HEPA-filtered, clean, without significant dents, marring, or otherwise unprofessional appearance. Coordinate with the Environmental Consultant for inspection and approval prior to bringing this equipment into a building. Conduct DOP testing on-site in the presence of the City's Environmental Consultant for all HEPA-filtered units.

I. Air Filtration Devices shall, at a minimum, conform to the following:

1. Filtration devices shall be high efficiency particulate absolute (HEPA) filtration systems bearing a UL 586 label indicating its ability to perform under specified conditions. Filters shall be marked with the name of the manufacturer, serial number, airflow rate efficiency and resistance, and the direction of the test airflow. Provide units with two stages of pre-filtering, as follows:

   a. A low efficiency type first stage pre-filter for particle sizes 100 micrometers and larger.

   b. A medium efficiency type second stage pre-filter effective for particle sizes down to 5 micrometers.

   c. Pre-filters installed either on or in the intake grid to the exhaust unit and held in place with special housings or clamps.

2. HEPA-filtration exhaust units are to include:

   a. An elapsed time meter showing the total accumulated hours of operation.

   b. An electrical interlock preventing operation of the unit without a HEPA filter.

   c. An automatic shutdown system to stop the fan in the event of a rupture in the HEPA filter or a blocked air discharge.

   d. Warning lights to indicate normal operation (green), moderately high pressure drop across the filters, such as due to filter overloading (yellow), and too high of a pressure drop due to an overloaded or ruptured HEPA filter or obstructed discharge (red).

   e. An audible alarm if the unit shuts down due to operation of the safety systems.

   f. Electrical components approved by the National Electrical Manufacturers Association (NEMA) and the Underwriter's Laboratories (UL). Each unit shall be equipped with overload protection sized for the equipment. Properly ground the motor, fan, fan housing, and cabinet.

   g. A cabinet constructed of steel or aluminum capable of withstanding damage from rough handling and transportation, with a width under 30-inches to fit through a standard-size doorway, mounted on casters or wheels.

h. Several spare HEPA-filtered exhaust units on-site to be used as needed should active units fail.

J. Waste Containers:

1. Waste Receptacles to conform to federal and State regulations, with 6-mil minimum thickness or glove bags or waste bags.

2. Sealable drums shall be of 30- or 55-gallon capacity constructed of fiber or metal with tightly fitting lids for hazardous waste disposal. Label the drums and bags in accordance with U.S. EPA and local Air Quality Management District requirements, including the Generator I. D. number or location identification, and manifest number. Provide air and watertight drums. If previously used, the drums shall be food grade and shall be approved by the City Representative prior to their storage or use on-site. Sealable polyethylene bags shall be of 6-mil minimum thickness for asbestos disposal. Size bags to fit within drums specified above.

K. Cleaning Agents:

1. Cleaning agents, equipment, and methods employed shall not in any way damage the substrate or adjoining surfaces and finishes. Cleaning solvents shall be non-injurious to the surfaces upon which they are applied. The methods used shall cause no pitting, erosion or damages to the surfaces.

2. Do not use chemicals that may attach or leave deposits on the substrate material. Modify the process or processes to suit the finish, hardness, and condition of the surface to be cleaned.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Review hazardous materials reports and information and ensure the information is available to all subcontractors and trades.

B. Promptly notify the City Representative of differing conditions of for suspected materials not identified or listed under Section 01 35 44.

C. Notify the City Representative, in writing, a minimum of 48 hours in advance of any planned disturbances to any hazardous materials or prior to performing any hazardous materials abatement.

D. Disturbance of asbestos or lead and other hazardous containing materials, including demolition, surface preparation, or removal of paint, can contaminate air, soil, and water surrounding the work site. It is the responsibility of the Contractor to evaluate and determine the most appropriate level of containment necessary to prevent the uncontrolled release of hazardous materials from the work site.

E. As per Cal/OSHA regulatory requirements, establish the required site controls, class of containment, of ventilation, and of air monitoring as appropriate for the removal means and methods as selected to perform the specific removal work. These systems shall be sufficient to control exposures to workers, the public, and to protect the surrounding environment.

3.2 PREPARATION

A. Protective Procedures and Workers Protection

1. Protect Visitors and Other Site Personnel: Cordon off the hazardous materials removal and hazard control area(s) with appropriate signs, and provide temporary tunneling or scaffolding, as applicable.

2. Provide site security to assure that no member of the public or any unqualified or untrained person is able to gain access to any hazardous materials work area at any time while maintaining open access and egress routes at all times.
3. Provide worker training, respiratory protection, and medical examinations to meet applicable regulations.

4. Provide temporary lighting and power to work areas, including installation of ground fault interrupters as required. Ensure that all electrical power terminating in the work area, including but not limited to outlets and lights are disconnected and cannot be re-energized during the course of the work. Fully ground all equipment within the work zone and decontamination assemblies.

5. Construct enclosure system(s) for worker and equipment decontamination.

6. Establish negative pressure in work area(s) as required under 8 CCR Section 1529. Follow and follow hazard control procedures as outlined under Cal/OSHA regulations CCR 1532.1 and CDPH regulations 17 CCR Sections 35001 through 36100

7. Provide workers with sufficient sets of protective full-body clothing to be worn in the designated work area and whenever a potential exposure to lead, asbestos, and hazards exists. Such clothing shall include but not be limited to full-body coveralls, headgear, eye protection, and gloves. Disposable-type protective clothing, headgear, and footwear may be provided.

8. Respiratory Protection: Comply with Cal/OSHA Regulations included in 8 CCR Sections 1529, 1532.1 and ANSI Standard Z88.2, "Practices for Respiratory Protection: Workers shall wear appropriate respiratory protection during lead, asbestos and any other hazards work, unless negative exposure assessment testing verifies that employee exposures are below the PEL or Action levels.

B. Site Protective Controls:

1. Locate temporary scaffolding and dust barriers, as required, and proceed with the construction or demolition, allowing for continued operation of any adjacent occupied areas, as applicable.

2. Erect temporary protective covers over pedestrian walkways and at points of passage for persons or vehicles, which are to remain operational during the work.

3. Where life safety systems shall be made non-operational, coordinate shutoff with City. Protect all wiring associated with the system.

4. Air Filtration Device

   a. Differential air pressure systems for each work area to be in accordance with Appendix J of the EPA's "Guidance for Controlling Asbestos-Containing Materials in Buildings," EPA 560/5-85-024.

   b. Minimum work area differential air pressure of -0.025 inches w.g. at all times when required, including during the removal, gross clean-up, waste transfer, and encapsulation activities. Account for fluctuations of the negative pressure by aiming for a higher-pressure differential at the project outset to ensure that the chances of the pressure differential dipping below -0.025 inches w.g. are minimal.

c. Provide sufficient number of units for each work area to maintain differential air pressure in the work area at -0.025 inches w.g. between the work area and adjacent non-work areas at all times, allowing for stack and thermal effects. Locate unit(s) so that the primary make-up air enters the zone through the decontamination facilities and traverses the work area as much as possible, unless otherwise approved by the City Representative.

d. Provide on-site certification of all HEPA-filtered negative pressure units to document adequate filtration efficiency for all units exhausting internally within the building or as otherwise required by the City. Systems shall be certified by a third-party to conduct onsite dioctylphthalate (DOP) or Portacount challenge testing, signed by an independent tester or the Contractor's Site Safety Representative. DOP testing shall verify an in-situ efficiency of 99.97% or greater. Portacount testing shall verify an in-situ efficiency of 99.3% or better.

5. Exhaust Air:

a. Establish negative pressurization within the work area exhausting air ducted through temporary panels located in window frames or exterior doorways. Such panels must be designed to prevent rainwater from entering the work area.

b. Unless otherwise directed by the City Representative the Contractor shall replace windows any windows removed at the completion of hazardous materials removal work. Vent exhaust air to the exterior of the building at locations approved by the City Representative unless otherwise noted or directed.

c. Do not locate exhaust outlets near or adjacent to other building intake vents or louvers or at the entrances to the building. Do not exhaust air into the building interior spaces or within 50 feet of the building's supply air intakes, unless otherwise noted or directed by the City.

6. Decontamination Enclosure Systems

a. Construct a decontamination enclosure system (as a minimum) in accordance with OSHA Regulation 29 CFR Part 1926.1101 and Cal/OSHA Regulation 8 CCR Sections 1529 and 1532.1. The systems shall be contiguous to the work area consisting of three totally enclosed chambers and airlocks. Mobile isolation enclosures will be permitted in areas where space limitations will not permit such construction.

b. For Work Class I, II and III work areas, provide as a minimum, with a two (2)-stage decontamination assembly, including an equipment and contiguous clean room with bucket wash-up facilities. A shower will be required if the work is greater than 25SF.

c. Post all emergency phone numbers, notifications, emergency exiting diagrams and procedures, as required.

d. Post danger signs at the entrance to all decontamination units, per OSHA Regulation 29 CFR Part 1926, 1529 and 1532.1.

e. The City’s Representative prior to construction must approve location of decontamination enclosure systems

f. Mobile Isolation enclosure(s) shall be constructed of rigid frames (either 2 x 4-inch wood construction or PVC tubing, as appropriate) and polyethylene sheeting or rigid Plexiglas sheets. Do not tape, nail, puncture or disturb asbestos containing building materials to attach, or secure the mini enclosure system.

g. No eating, drinking, smoking, or chewing gum or tobacco is permitted in or near the asbestos or lead work areas or decontamination enclosure systems except in areas designated by the City. Smoking will not be permitted in the clean room and near storage or usage areas of flammable materials, such as spray adhesive and mastic removers.

3.3 ASBESTOS ABATEMENT PREPARATION

A. Notifications:

1. Notify the City, in writing, a minimum of 48 hours in advance of any asbestos-abatement work.

2. Notify, in writing, the BAAQMD at least 10 working days prior to commencement of any asbestos project equal or greater than 100 linear feet (LF) or more than 100 square feet (SF) or 35 cubic feet or more of regulated asbestos-containing materials. Obtain a J#.

3. Notify Cal/OSHA a minimum of 24 hours in advance of any disturbances of any amount of friable or non-friable asbestos-containing materials or prior to performing asbestos-related work.

4. Advise the Contractor's Site Safety Representative (SSR) of suspect conditions. Do not remove or disturb suspect materials until tested and approved.

B. Prohibited Activities:

1. Asbestos-containing materials shall not be disturbed by cutting, sawing, grinding, pulverizing, crumbling, breaking, or otherwise rendered friable or airborne unless these activities are conducted under the requirements of all applicable regulations and guidelines.

2. Only a registered Asbestos Abatement Contractor per Cal/OSHA regulation 8 CCR 1529 shall complete Work exceeding 100-sq. ft. or 100 linear feet or 35 cubic feet of asbestos-containing construction materials.

C. Demolition of non-ACM obstructing known intact ACM:

1. Remove non-contaminated and non-asbestos materials for access using standard dust control procedures as required for painted assemblies and construction housekeeping controls.

2. Minimize disturbances to substrates concealing friable or damaged asbestos-containing materials, such as laid-in ceiling tiles concealing asbestos-containing fireproofing, demolition of non-ACM partitions which may destabilize sprayed-on asbestos-containing acoustical finishes, etc. Qualified workers shall conduct work impacting asbestos-containing materials.

D. Unexpected exposure to known or suspect Asbestos-Containing Material (ACM):

1. Where ACMs are discovered intact, such as intact pipe lagging, proceed to cordon off the affected area and immediately post it with a "caution" sign to prevent unintentional disturbances. Immediately alert the Contractor's Site Safety Representative of the conditions for proper removal and disposal procedures.

2. Where ACMs are damaged or suspect asbestos contaminated conditions are encountered, discontinue work in the immediate suspected area, shutdown the area's HVAC system, if not already disengaged, and alert the Contractor's Site Safety Representative of the conditions for proper removal and disposal procedures.

E. Unexpected release of asbestos into the environment:

1. Cordon off the immediate area (10 to 20 ft. radius minimum), and shutdown the area's HVAC system (if applicable).

2. Notify the Client, the City Representative, and the Environmental Health and Safety Department immediately.

3. Notify the Contractor's Site Safety Representative for proper removal and disposal using wet methods and HEPA-filtered vacuums. Clean-up work shall be completed under the directions of a Competent Person with 16-hour minimum EPA Operations and Maintenance asbestos training and by workers with 2-hours asbestos awareness training minimum unless exposures exceed the permissible exposure limit (PEL) of 0.1 fibers/cc.

4. Decontaminate or dispose of friable waste in double 6-mil thick goose necked labeled waste bags for manifesting and disposal.

F. Work area set up and protection:

1. Pre-Cleaning

a. Work Areas: Pre-clean surfaces in workspace. If the space has any contamination in the opinion of the City, then the Contractor shall install air locks and negative pressure system prior to pre-cleaning.

b. Fixed Objects: Pre-clean all fixed objects within the proposed work areas using HEPA filtered vacuum equipment and/or wet cleaning methods, as appropriate. Enclose with a layer of 6-mil polyethylene sheeting sealed with tape unless specified otherwise.

c. Ductwork: Pre-clean and wrap all active and inactive ductwork within the zone with a minimum of two layers of 6-mil polyethylene sheeting sealed with tape, unless otherwise directed by the City Representative.

d. Removable Objects: Pre-clean removable objects within the proposed work areas exposed to friable ACM or debris using HEPA filtered vacuum equipment and/or wet cleaning methods, as appropriate. Properly remove and dispose of objects from work area before abatement operations commence

e. Work area surfaces or items scheduled to remain covered with polyethylene sheeting during the clearance air sampling shall be inspected and approved by the City Representative upon completion of pre-cleaning before critical barriers are erected or any other removal procedures are initiated.

f. The Contractor shall inspect all of its equipment and shower pans that it brings to the work site before and after its use and ensure that such equipment is not contaminated.

2. Critical Barriers

a. Seal off all openings, including but not limited to corridors, doorways, ducts, grilles, diffusers, pipe chases, drains, grates, and any other penetrations of the work areas, with 6-mil polyethylene sheeting sealed with tape. Use caulking where necessary to ensure a complete seal.

b. Except for emergency exits, doorways, which will not be used for passage during work, must be sealed by first applying tape over the gap between the closed door and the doorframe and the gap between the bottom of the door and the floor.

Then apply 6-mil polyethylene sheeting over the door and seal it with tape to the wall and to the floor.

c. Seal windows by applying two layers of 6-mil polyethylene sheeting sealed independently to the wall with tape.

d. HVAC registers and returns shall be sealed with metal or rigid plastic covered by polyethylene sheeting. Polyethylene sheeting is not an acceptable alternative.

e. At any time during the abatement activities after barriers have been erected, if visible suspect dust is observed outside of the work area or if the barriers are damaged, work in the abatement area shall immediately stop. Repair the barriers, and clean-up debris/residue using appropriate HEPA vacuuming and wet cleaning procedures before work recommences.

3. Regulated Work Area Isolation and Controls

a. Establish a pressure differential of -0.025 inches w.g. with manometer reading records. Submit manometer readings daily or upon request.

b. Conduct DOP testing of the HEPA-filtered negative pressure units and vacuum cleaners on site.

c. Install a transparent view port per work area for inspections.

d. Notify the City Representative for changes in work practices immediately to allow the facility's Health and Safety Officer the opportunity to notify and prepare the surrounding employees, as the new procedures may impact the surrounding areas (due to noise, vibration, etc.).

e. Use a calibrated manometer to monitor the negative pressure, and provide the manometer print out to the City's oversight Consultant at the end of the work shift.

4. For projects on City and County of San Francisco Department of Public Health (SFDPH) sites' public and occupied areas, the following additional regulated work area isolation and controls shall be implemented:

a. Install a secondary perimeter with a 'Caution Construction' sign or equivalent. The asbestos sign is to be posted between the secondary construction perimeter and the actual regulated asbestos work area.

b. Establish a pressure differential of -0.04 inches w.g. with manometer reading records. The negative pressure containment shall have been setup for 24 hours demonstrating uninterrupted negative pressurization of -0.04 inches w.g. or better. Submit manometer readings daily or upon request. Conduct DOP testing of the HEPA filtered negative pressure units on site.

c. Install a transparent view port per work area for inspections.

d. Notify the City Representative for changes in work practices immediately to allow the facility's Health and Safety Officer the opportunity to notify and prepare the surrounding employees, as the new procedures may impact the surrounding areas.

e. Work shall be scheduled with more than 72 hours' notice to the area's users.

5. Full Isolation Work Areas - Sequence of Major Events

1. This subsection outlines the sequence of events only. Modify the sequence as required if the work area is considered contaminated or if demolishing ACM or non-asbestos materials is required for access to the required abatement materials. Refer to other applicable sections of this specification for detailed requirements.

2. Cordon off the area with appropriate signs.

3. Deactivate HVAC system, unless otherwise noted or directed.

4. Protect or remove carpeting, if present, as appropriate. Contaminated carpeting will require decontamination by steam cleaning or disposal, as directed by the City

5. Pre-clean work area, as necessary.

6. Establish temporary power and lighting.

7. Construct critical barriers.

8. Construct decontamination enclosure systems. All work areas shall contain a worker decontamination enclosure system and an equipment decontamination enclosure system, unless otherwise noted or directed.

9. Erect 6-mil polyethylene sheeting on the walls, windows, ceiling and floor, as applicable.

10. Establish negative pressure within the work area.

11. Request and facilitate a second work area preparation inspection from the City's Representative following demolition and preparation of the final critical barriers, where applicable.

12. Remove ACM employing wet cleaning methods, HEPA vacuuming and proper work practices.

13. Clean-up work area.

14. Dispose of asbestos-containing waste.

15. Work area final clean up

3.4 HAZARDOUS MATERIALS REMOVAL PROCEDURES FOR CONTROLLED RENOVATION

A. Controlled Renovation Procedures for Installation of Anchors and Minor Disturbances to Asbestos- Containing Material under one hundred square feet (<100 SF) or under one hundred linear feet (<100 LF), except thermal system insulation (TSI) or surfacing materials (including but not limited to vinyl floor tiles, carpet or tile mastics, transite board, sheetrock wallboard, ceiling tile mastics).

1. Minor work affecting non-friable materials, such as drilling molly anchors into wallboard or seismically bracing equipment through asbestos-containing may be completed by trained construction workers or maintenance personnel following procedures under the General Industry Asbestos Standards, 8 CCR 5208. All Operations and Maintenance procedures and personnel training records must be pre-approved by the City Representative, or the Environmental Consultant prior to commencement of activities.

2. Demarcate the area of exposure to minimize traffic within the area and to protect persons outside the area from airborne asbestos exposures, even if a negative exposure assessment has been produced.

3. Assemble equipment and supplies, including but not limited to a Hudson sprayer, an HEPA- filtered vacuum, polyethylene drop cloths and wetted sponges.

4. Install a drop cloth below the area to be disturbed on the floor and other surfaces and shoot or drill the anchor through the wetted sponge or cut the material through a wetted sponge, as applicable. HEPA vacuum the area following all work and place the sponge and debris into a sealed plastic disposal bag. Do not use these procedures on asbestos-containing thermal system insulation (TSI) or asbestos-containing surfacing materials, such as asbestos fireproofing or acoustical sprayed-on plaster finishes.

5. Immediately clean up all debris dislodged from coring or drilling through asbestos and trace asbestos substrates using a wetted sponge and HEPA vacuum. HEPA vacuum the area immediately following completion of the controlled renovation procedures. Dispose of the debris as non-friable asbestos waste. Contamination of the site by use of improper procedures will require extensive clean-up and clearance air sampling by the City, at the Contractor's expense.

6. The following materials are classified as not "surfacing" materials for controlled renovation purposes involving anchoring or minor disturbances

    a. Vinyl Floor Tiles: Cordon off the room or area and remove the floor tiles before drilling through the concrete or wooden substrate. Vinyl floor tiles can be removed using heat or manual means such as hand scrappers. Where tiles cannot be removed in advance of coring, saturate the tile with shave cream and core through the tiles, frequently wiping up all chips and debris and disposing as Category 1 non-friable waste. Wet wipe with a clean sponge and HEPA vacuums the area upon completion of work. Seal off the area below the core capture any debris that can fall into the ceiling plenum or crawl space below.

    b. Carpet Mastics: Cordon off the room or area and cutout the carpeting and mastics using a carpet knife, saturating the carpet with water to prevent airborne asbestos fiber releases. Remove excess mastics using a mastic remover with a flash point greater than 140 deg. F., as approved by the City. Dispose of the carpet segment and mastics as Category 1 non-friable waste. Wet wipe and HEPA vacuum the area following completion of the controlled renovation procedures.

    c. Vinyl Floor Tile Mastics: Cordon off the room or area and remove the mastics using a mastic remover with a flash point greater than one hundred and forty degrees Fahrenheit (>140 deg. F.), as approved by City. Dispose of the mastic and rags as Category 1 non-friable waste. Wet wipe and HEPA vacuum the area following completion of the controlled renovation procedures.

    d. Transite Board and Mastics: Cordon off the room or area and remove the board intact, where feasible, following installation of drop cloths below. If removal is not feasible, drill through the board using the shaving cream methods described

    e. Sheetrock Wall or Ceiling Board: Shoot or drill anchors through a wetted sponge, where feasible, or use a Hilti-brand rotohammer drill equipped with a spring-loaded local exhaust hood connected to a HEPA-filtered vacuum cleaner. Cordon off the room or area and cut holes for receptacles or other devices using drop cloths on the ground and wet methods. Remove the sheetrock avoiding the

joint compounds, where feasible. Continually wet the controlled renovation area during the process and wet wipe and HEPA vacuum the area following completion of the controlled renovation procedures.

f. Thin-Layered Asbestos-Containing Paints: Shoot or drill anchors through a wetted sponge or use a Hilti-brand rotohammer drill equipped with a spring-loaded local exhaust hood connected to a HEPA-filtered vacuum cleaner, where feasible. Cordon off the room or area and core using drop cloths on the ground and wet methods. Continually wet the controlled renovation area during the process and wet wipe and HEPA vacuum the area following completion of the controlled renovation procedures. Dispose of the paints as Category 1 or 2 non-friable wastes as determined by the substrate's composition.

g. Linoleum Backing: Cordon off the room and work area and cutout the linoleum, using a carpet knife prior to coring. Wet the backing using water and shave cream and remove the asbestos containing backing intact. Dispose of debris as friable asbestos waste. Wet wipe and HEPA vacuum the area of the controlled renovations for final clearance. Do not allow linoleum on cores to fall into the ceiling plenum or the space below, as applicable.

7. Other Non-Friable Materials: Complete controlled renovation procedures in compliance with Cal/OSHA's Work Class 2 procedures per 8 CCR 1529.

8. A Cal/OSHA & DOSH registered, and licensed Asbestos Abatement Contractor shall complete work equal or greater than one hundred square feet (100 SF) or one hundred linear feet (100 LF) or asbestos-containing construction materials or other work as required in the Abatement Work Plan.

B. Controlled procedures for installation of anchors or coring through friable asbestos materials, including but not limited to sprayed-on or troweled-on acoustical plasters, structural fireproofing, and linoleum backing (as applicable):

1. Avoid contact with friable ACM where practical. Anchor to non-ACM materials where feasible.

2. Install drop cloths on the ground and use a glovebag or mini-containment constructed of 6-mil polyethylene sheeting to contain work affecting friable materials.

3. Wet the ACM with water and remove limited material as required for installations. Immediately clean up all debris and seal the waste in a double 6-mil disposal bag for disposal as asbestos waste.

C. Core drilling through ACM:

1. Assemble equipment and supplies, including but not limited to Hudson sprayers, nylon brushes, HEPA vacuums, labeled polyethylene disposal bags, approved encapsulant, duct tape, 5-in-1 tools, plastic buckets, etc.

2. Coordinate exact location of the core hole, marking the location on the underside of the structure. Spray material to be disturbed with an approved penetrating encapsulant, restricted to the area of removal and disturbance only.

3. Remove asbestos-containing materials following set-up of the isolation area under full isolation procedures or glove bag removal procedures.

4. Cordon off the area with appropriate signs and deactivate the HVAC systems, as appropriate.

5. Isolate the area with a mini-containment and decontamination assembly, and pre-clean and wrap fixed items and surfaces, as appropriate. Establish a mini-containment and decontamination assembly in the floor below.

6. Establish negative pressure within the mini containment.

7. Begin coring from the floor above, protecting against water seepage or spraying near active electrical or telephone equipment. After coring is complete, double bag, and encapsulate the raw edges of the cored hole with an approved penetrating encapsulant.

8. Clean up any residual debris and insert a non-conductive sleeve into the hole, extending 6-inches minimum below the asbestos coating. Properly secure the sleeve and seal the openings around the circumference with a fire-rated caulking or seal.

9. Dispose of ACM waste and proceed with the final work area clean up and inspection.

D. Hanger installation:

1. Assemble equipment and supplies, including but not limited to Hudson sprayers, nylon brushes, HEPA vacuums, labeled polyethylene disposal bags, approved encapsulant, duct tape, 5-in-1 tools, plastic buckets, etc.

2. Lightly wet the material with an approved penetrating encapsulant, using a 5-gallon bucket lined with a plastic bag as a catch basket during the installation of the hanger or anchor. Cut an appropriately sized hole in the bottom of the bucket for the anchor grip to reach through. Place the plastic bag in the bucket, and with one hand, push the bottom of the anchor through the hole in the bucket sandwiching the plastic bag between the anchor and the gun grip. Locate the anchor location and push the bucket tight against the material before setting the anchor. Carefully lower the bucket and the gun and dispose of the waste gathered in the bag and any loosened materials.

3. As an alternative to the above procedures, lightly wet the material with an approved encapsulant, placing a 3" x 5" sponge dampened with encapsulant against the material. Shoot the anchor or drill through the sponge so that any localized loosened material is trapped between the sponge and substrate. Leave the sponge in place, removing any signs of loose or dislodged debris. Re-spray any loosened materials with an approved encapsulant, restricted to the area of the disturbance

4. Clean-up the immediate area using wet methods and a HEPA vacuum. Dispose of friable plasters, linoleum backing, fire proofing and thermal system insulation as friable asbestos waste.

E. Coring on Fireproofing and Textured Acoustical Plasters:

1. Cordon off the area and set-up negative pressurization of the controlled renovation activity using glovebag or mini-containment methods. Do not drill or core openly through friable ACM. A Certified Asbestos Worker only under Cal/OSHA Work Class I or III procedures, as applicable shall complete such work. Wet the materials throughout the controlled renovations. Do not allow ACM on cores to fall into the ceiling plenum or Crawl Space below. Following the controlled renovation activities, clean up the mini containment using wet methods and a HEPA vacuum. Gooseneck and dispose of the glovebags, where applicable, within a double waste bag.

F. Work within crawl spaces, confined spaces, or plenums with Thermal System Insulation (TSI): Control Renovation Procedures for Friable Asbestos Materials:

1. Core or anchor through adjoining non-ACM materials, where feasible. If not feasible, cordon off the area and set-up negative pressurization of the controlled renovation activity using glovebag or mini-containment methods per 8 CCR 1529.

2. Do not drill or core openly through friable ACM. Wet the materials throughout the controlled renovations. Do not allow ACM on cores to fall into the ceiling plenum or Crawl Space below. Following the controlled renovation activities, clean-up the mini containment using wet methods and a HEPA vacuum. Gooseneck and dispose of the glovebags and waste in double goose necked bags as friable asbestos waste.

3. Adhere to all the requirements for confined spaces as follows:

   a. It is the responsibility of the Contractor to provide all equipment and assistance to make the confined space safe for entry by the Contractor's employees, the City Representative, and its representatives in accordance with the California Code of Regulations, Title 8, General Industry Safety Orders entitled "Confined Spaces."

   b. If any activities associated with confined space entry become necessary, the Contractor shall be required to consult the City for guidance and prepare an appropriate Permit-Required Confined Space Entry Plan.

G. Asbestos-Containing Sheetrock and Joint Compound:

1. Lightly spray the material to be disturbed by spot removal, drilling, etc., with an approved penetrating encapsulant, restricted to the area of disturbance only. For anchoring into ACM, locate the attachment location and push an encapsulant-wetted sponge between the stud or joist and the existing sheetrock before setting the anchor. Carefully shoot the anchor or drill through the stud or joist and sponge, and HEPA-vacuum any loosened materials or debris. For small-scale removals, penetrate the material with care, using a sharp utility knife or other appropriate tools, removing the encapsulated section and catching it directly into a lined bucket or waste disposal bag, where feasible, disposing of as asbestos waste. HEPA-vacuum the edges of the remaining materials and re-encapsulate the friable edges of the remaining sheetrock with penetrating encapsulant. Do not disturb materials beyond the limited scope of work.

3.5 HAZARDOUS MATERIALS REMOVAL PROCEDURES

A. Asbestos-Containing Thermal System Insulation (TSI)

1. Set-up a full isolation containment or a secondary containment for all glovebags abatement areas. Install critical barriers with two layers of polyethylene sheeting on the floors and on the walls. Set up a full decontamination system with shower for quantities greater than 25 LF, unless otherwise directed by the contract documents.

2. Areas with evidence of damaged TSI will require HEPA-vacuuming of the access to this debris as well as vacuuming of all piping, ductwork and substrate materials within a minimum five (5) ft. radius of all such contamination.

3. Use wet methods and HEPA vacuums. The removal of TSI shall be sufficient to accommodate access by applicable trades within the plenum, wall cavity or crawl space zone for routing of conduit, cables, etc. Coordinate with abatement of other applicable materials.

4. Pipe Insulation Removal: Cut and separate metal bands, where appropriate. Locate the section length (typically three feet) and cut around the circumference at the end of the attached section. Twist the section to ensure it is free from the pipe. Using an airless sprayer, saturate the exterior of the covering with amended water to limit fiber

release. Locate the upper and lower half seam and position one seam at the top of the pipe. After positioning, cut along the length of the section and carefully open each half. Immediately saturate the exposed inner surface thoroughly with amended water. Lower both halves into 6-mil polyethylene disposal bags. Do not place or allow insulation to fall on the floor. Pick-up debris falling on the floor and place it in disposal bags immediately. Clean to remove all debris remaining on the pipe.

5. Fitting Insulation: Saturate fitting insulation with amended water. Remove fitting insulation using scraping tools, hand pressure and brushing. Immediately saturate the exposed inner surface thoroughly with amended water. Do not remove insulation by striking or chipping the surfaces. Deposit fitting insulation directly into 6-mil disposal bags. Do not place or allow insulation to fall on the floor. Pick-up debris falling on the floor and place it in disposal bags immediately. Clean to remove all debris left on fitting.

6. At a minimum, use glove bags procedures as per Cal/OSHA Regulation 8 CCR 1529, Asbestos Activity Class/Category - Work Class I when removing Asbestos – Containing Thermal System Insulation (TSI) materials.

7. Disassemble the pipping tanks and mechanical component on the boiler and heater systems using wet methods. Saturate the packing ACM before removing the bricks, pipes, and other ACM insulated (tar paint, canvas, materials, etc.)

8. Dispose of TSI and packing material in double goose necked-labeled bags or double wrap cutout sections in 6-mil polyethylene sheeting and properly labeled as friable asbestos waste.

B. Friable Insulation, Fireproofing, Acoustical Plaster, and, Laid-in; Splined or Glued-on Acoustical Tiles

1. Mist asbestos material with amended water, using airless sprayers, or spray equipment recommended by the surfactant manufacturer and capable of providing a "mist" application to reduce the release of fibers. Saturate the material sufficiently to wet it to the substrate without causing excessive dripping or de-lamination of the material. Mist the asbestos material continuously during work process to maintain damp conditions and to minimize asbestos fiber dispersion, but without accumulating water on the floor.

2. Remove ACM and overspray from all surfaces, including but not limited to structural steel, deck, walls, ceilings, ducts, insulation, piping, conduit, junction boxes, push-pull clips, cables, etc.

3. Remove the saturated ACM in small sections. As it is removed, place the material in sealable plastic bags. Do not allow materials to dry out prior to insertion into the bags. Do not permit materials to accumulate on floors and other surfaces in the work area.

4. After removing the ACM, wet and wipe all surfaces, or use a soft-bristle brush to remove all residual accumulated material. Clean all surfaces with special emphasis on the top edge of the Spray-Poly or polyethylene covers.

C. Asbestos Floor Coverings

1. Mastic removal solvents, procedures, and equipment information submittals must be approved prior to floor coverings removal.

2. In flooring areas where a solvent-based mastic remover is to be applied, the Contractor shall use a low odor mastic remover. The Contractor shall submit the

Safety Data Sheets (SDS) of the mastic remover it intends to use, for the review and approval of the oversight Consultant. After the application of a solvent-based mastic remover, the Contractor shall rinse the flooring areas by wet-moping, applying "simple green cleaner" or equivalent, scrubbing floors, and finalize the clean up by re-moping with clean water. The Contractor shall provide adequate ventilation to exhaust out the odors from the solvent-based mastic remover. The Contractor shall ensure that no odors from the solvent-based mastic remover remain.

3. Vinyl floor tiles adhering to old non-ACM linoleum or tiles may require removal of the sub flooring intact to remove the overlying asbestos-containing mastic residues. For Demolition Projects: Remove leveling compounds under VAT and non-VAT removal areas as asbestos containing unless otherwise noted

4. Use an approved mastic removal solvent following the manufacturer's recommended procedures. Wipe residual material and dispose of waste and rags in a proper manner.

5. Where removing the mastic is feasible without the use of solvents, use water with liquid dishwashing detergent (1 ounce of detergent to 1 gallon of water), and scrub surfaces as required to remove residual material, scraping the wetted surface with a stiff-bladed wall or floor scraper. Wipe residual material and dispose of rags as ACM waste. Wet vacuum standing water with a HEPA vacuum.

6. Use of an approved portable shot abrasive "bead blaster" system that strips, cleans, and etches the floor, shall follow the manufacturer's recommended procedures. This method can dislodge sprayed-on fireproofing and/or sprayed-on acoustical plasters on the floor below due to excessive vibrations, where applicable. Therefore, adhesion and cohesion testing of these materials shall be conducted prior to the bead blaster's use. Usage of this system will require a variance from Cal/OSHA and the local Air Quality Management District (BAAQMD) as a "dry removal" method and approval of the City Representative.

7. Use of a buffer for mastic removal will require wet buffing only. Using a buffer will render the mastic onto a friable state. The Contractor shall conduct mastic removal using a buffer following the BAAQMD Regulation 11, rule 2. Buffer brushes shall be disposed of after each use as asbestos waste. Thoroughly remove all mastic residues from the buffer before removal from the work area.

D. Vinyl Floor Tiles and Mastics:

1. Remove the flooring and mastics as indicated on the Contract Drawings using full isolation procedures, satisfying the requirements of Cal/OSHA Regulation 8 CCR 1529, Work Class II.

2. Set-up critical barriers and splash guards and establish negative pressurization.

3. Remove the tiles using wet methods to minimize breakage and airborne fiber releases.

4. Remove the mastic using an approved mastic remover.

5. HEPA vacuum the contained area following abatement for clearance.

6. Provide a full decontamination system with shower for areas exceeding 25 SF.

7. Dispose of tiles and mastic as Category 1 wastes.

E. Linoleum Flooring and Mastic:

1. Remove the flooring and mastics as indicated on the Contract Drawings using full isolation procedures, satisfying the requirements of Cal/OSHA Regulation 8 CCR 1529, Work Class II and BAAQMD Regulation 11, Rule 2.

2. Set-up critical barriers and splash guards and establish negative pressurization.

3. Remove the linoleum backing using wet methods to minimize breakage and airborne fiber releases.

4. Remove the mastic using an approved mastic remover.

5. HEPA vacuum the contained area following abatement for clearance; minimize use of encapsulant on substrates to be retiled.

6. Provide a full decontamination system with shower for areas exceeding twenty-five square feet (>25 SF).

7. Dispose of linoleum backing and mastics as friable asbestos waste.

F. Electrical/Wiring Insulation:

1. Remove wiring by cutout of the conduit in manageable sections, where possible. Otherwise, pull the wire through the conduit with a properly sized sponge wetted with encapsulant tied to the distal end, misting the insulation continually and HEPA vacuuming any residual debris. Avoid unnecessary cutting or peeling.

2. Clean up the area and dispose of the asbestos-containing waste. Wire bundles may be wrapped in burlap or cardboard, prior to bagging, to protect against penetrating the disposal wrapping.

G. Removal of Tar coated Electrical Wrap

1. After confirming that the systems have been de-energized, including the proper deployment of Log out/Tag out procedure, remove materials using full isolation or mini-containment procedures, satisfying the requirements of Cal/OSHA 8 CCR 1529 Work Class 2 procedures. Use wet methods for dust controls. Dispose of materials as non-friable asbestos waste.

H. ACM Paint of Ceiling Plasters

1. Remove materials using full isolation or mini-containment procedures, satisfying the requirements of Cal/OSHA 8 CCR 1529 Work Class 2 procedures. Use wet methods for dust controls. Dispose of materials as non-friable asbestos waste. Remove substrates as required to access materials and overspray.

2. Removal of larger ceiling segments, particularly demolition of elements that may impact paint finishes (see Demolition Plans), shall be completed under full isolation or mini-/mobile containment procedures by a licensed Abatement Contractor. The Asbestos Contractor using glovebag and mobile mini-containment methods or full isolation methods, depending on the quantities impacted, shall complete coring greater than two (2) inch diameter, which cannot be properly controlled using a wetted sponge.

3. If a mobile containment is used, clean-up and reseal the phone booth-type containment and airlock entry between uses.

I. Window and Door Glazing Compounds

1. Remove windows and doors following abatement of other interior finishes and materials and wrap in a double layer of polyethylene sheeting, where feasible.

2. Where complete removal and disposal of the frames is not feasible, scrape the glazing compound following installation of polyethylene drop cloths under each window or door.

3. Scrape residual compounds from wood or metal frames, as applicable. Double bag and dispose of materials as Category I non-friable waste unless otherwise directed by the City.

J. Exterior/Perimeter Windows and Door Caulking

1. Cordon off the work area, installing critical barriers at the windows, doors, and other penetrations, as applicable.

2. Remove ACM using wet methods per Cal/OSHA Regulation 8 CCR 1529, Work Class II.

3. Set-up drop cloths on the ground and nearby objects to contain falling materials on the ground or public access areas surrounding the work area.

4. HEPA vacuum the sills and frames following abatement.

5. Provide a full decontamination system with shower for areas exceeding 100 sf.

6. Remove residual caulking from perimeter stucco, wood, metal, window and doorframes and concrete finishes, as applicable. Double bag and dispose of materials as Category I non-friable waste.

K. Roofing Material:

1. Seal any air intakes, operable windows, and skylights within 50 feet of the work area with 6-mil polyethylene sheeting secured in place over the opening. Weather conditions should be dry and wind conditions less than 10 mph with dry Establish a secured waste storage area where sealed bags of roofing material are stored during removal. Provide such areas for each different roof elevation or section. Line the storage areas with a layer of 6-mil polyethylene sheeting.

2. Employees and authorized visitors at the work site during on-going work shall wear approved respirators and full body disposable protective clothing as described in "Personnel Protection" and are required to fully shower out when exiting the abatement zone.

3. Set-up drop cloths on the ground under roofing removal area and abate the roofing materials using wet methods. Seal rooftop vents, windows, etc. with one layer of 6-mil polyethylene sheeting as a critical barrier. Bag or wrap waste in 2 layers of 6-mil polyethylene sheeting and lower to ground. Debris chutes must be sealed and negatively pressurized, if used.

4. Comply with the following Cal/OSHA requirements:

a. Adequate wet ACM per 8 CCR 1529 Para. (g)(B)(2).

b. Provide continuous misting of cutting machines per 8 CCR 1529 Para. (g)(B)(3).

c. Use HEPA vacuums or dust collectors during power cutting per 8 CCR 1529 Para. (g)(B)(4).

d. Do not throw ACM roofing off the roof per 8 CCR 1529 Para. (g)(B)(5).

5. For Disposal & Cleanup: HEPA vacuum the surrounding area following the abatement for final clearance. Dispose of all roofing debris as Category 1 non-friable asbestos waste.

6. Allow for a 20 ft. minimum buffer zone between the roof removal activities and other demolition or renovation work. Dampen the roof surface with a fine spray of amended water before proceeding with removal. Keep roofing material damp throughout the removal process.

7. Double bag roofing material in 6-mil labeled disposal bags and dispose of by methods described herein. Do not drop bags from the roof to the dumpster; transport bags without risk of their integrity utilizing the stairs or a lined waste chute. Where a lined waste chute is used, contain the opening to the dumpster with polyethylene sheeting and install a HEPA-filtration device to scrub the dumpster containment in the event of a bag rupture. Clean and seal the chutes overnight, as applicable.

8. HEPA vacuum and/or wet wipe the entire work site including adjacent roof area and removed areas following the roofing's abatement. The area may be sprayed with a light coat of encapsulant to lockdown all remaining asbestos fibers, except the skylights, as applicable.

9. Provide a full decontamination system with shower for areas exceeding one hundred square feet (100 SF).

10. Non-friable asbestos roofing material is considered non-hazardous and can be disposed of as non-hazardous asbestos waste. This can be transported and disposed of at a landfill-accepting Category I, non-friable ACM.

L. Window Glazing Putty

1. Set up the lead hazard control regulated areas. Ensure that drop cloths extend sufficiently, about ten (10) ft. minimum, in all directions.

2. Remove the windows intact to avoid disturbance to the window glazing putties. Burrito-wrap and dispose of windows as Category 1 non-friable waste. Where full removal intact is not feasible, close and seal windows and scrape putty utilizing drop cloths and wet methods. HEPA-vacuum the sills and surrounding area and use drop cloths, before final visual clearances.

M. Window and Door Glazing Compounds

1. Remove windows and doors following abatement of other interior finishes and materials and wrap in a double layer of polyethylene sheeting, where feasible.

2. Where complete removal and disposal of the frames is not feasible, scrape the glazing compound following installation of polyethylene drop cloths under each window or door.

3. Scrape residual compounds from wood or metal frames, as applicable. Double bag and dispose of materials as Category I non-friable waste unless otherwise directed by the City.

N. Fire Rated Doors

1. Remove fire doors with 45-minute or greater fire rating intact, burrito-wrap in two (2) layers of six (6) mil fire-retardant polyethylene sheeting and dispose as friable asbestos waste.

O. Lead – Containing Ceramic Tiles

1. Set up the lead hazard control regulated areas. Seal vents, windows, etc., with one layer of six (6) mil polyethylene sheeting as a critical barrier. Post signs.

2. Remove the ceramic tiles off from the substrate without bashing, cutting, grinding, or pulverizing the glaze, or include the ceramic tiles as part of the substrate demolition, if applicable. Bashing, cutting, grinding, or pulverizing glazed ceramic tiles is known to create significant airborne lead above the PEL.

3. Manually demolish ceramic wall tiles using drop cloths, wet methods, and HEPA vacuums for dust control in compliance with Cal/OSHA regulation 8 CCR 1532.1. Do not use power tools or airline tools to demolish ceramic wall tiles.

4. Avoid dry sweeping. Clean-up all work areas before leaving the site daily.

5. For tiles mounted to concrete, plaster or masonry substrates, isolate the room and establish negative pressurization of the work areas using HEPA-filtered negative pressure units and demolish the tiles using a pneumatic or electric chipper or jackhammer. Continuously mist the work area during chipping activities.

6. Dispose of debris as hazardous waste is waste characterization determines the waste to be hazardous. HEPA vacuum the fine debris and dust residues and dispose as hazardous waste.

P. Lead Sheeting

1. Set up a negatively-pressurized containment for removal of the sheeting. Seal vents, windows, etc., with one layer of six (6) mil polyethylene sheeting as a critical barrier. Post signs.

2. Remove lead sheeting intact by unscrewing panels from substrate. Doors with sandwiched lead sheeting shall be removed by the pins/hardware without disturbance to the sheeting within the core.

3. If unbolting panels cannot be performed, and cutting of sheeting is required, non-powered tool shall be used. Lead sheeting is relatively soft and pliable, manual tearing / cutting can be easily done. Absolutely no torching or welding on the lead sheeting or in the vicinity of the lead sheeting, until after the zone has been tested, cleared and released as a non-lead containment work zone.

4. Use wet methods and HEPA vacuums for dust control in compliance with Cal/OSHA regulation 8 CCR 1532.1. Do not dry sweep any dust or debris generated by removal of panels.

5. Wrap sheeting to prevent it from scratching and leaving score marks on the floor. Lead sheeting waste shall be rolled up and wrapped with 10-mil plastic sheeting, labeled, before taken out of the containment. All scuff marks left by the lead sheeting on any surfaces must be thoroughly scrubbed and cleaned.

6. Characterize and dispose of sheeting and debris as potentially hazardous waste.

7. HEPA vacuum debris daily for all work areas before leaving the site.

8. Triple wash all surfaces inside the containment prior to final lead wipe sampling by the Environmental Consultant.

Q. Painted Plaster Ceiling/Wall/Column Lead Paint Removal:

1. Provide ladders, scaffolding, etc., to access and remove paint and or paint/substrate from all surfaces, as applicable. Ceilings are to be scraped first in each area.

2. Remove materials at applicable locations. Wet wipe, as required. Lightly dampen the work surface and mist the surrounding area continuously throughout the scraping process.

3. Scrape and nylon brush decorative or rough ceiling surfaces or trusses, as applicable, to remove the paint and or paint/substrate. Then, HEPA vacuum these surfaces.

4. After scraping, HEPA vacuum all surfaces to remove any remaining dust.

R. Exterior Paint Removal:

1. Place drop cloths on the ground surrounding surfaces to catch any debris from scraping lead-based coatings, as applicable.

2. Erect temporary protective covers over pedestrian walkways and at points of passage for persons or vehicles, which may remain operational during the course of the paint removal.

3. Protect glass, metal trim and attachments, polished stone, or other sensitive materials and finishes from contact with chemical paint removers by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape. Apply masking agent to comply with the manufacturer's recommendations. Do not apply liquid masking agent to painted or porous surfaces, or masonry, as applicable.

S. Steel/Metal/Piping Spot Removal

1. Remove paints on steel components scheduled for welding or torching using a chemical stripper, needle gun or other approved methods as outlined in the approved Contractor’s Hazardous Materials Management Plan (HMMP).

2. Use drop cloths, polyethylene barriers, Hudson and airless sprayers and other methods as required for dust control.

3. Characterize and dispose of paints, rags, etc., separately for possible disposal as a hazardous waste.

T. Removal of Surface Coatings with Power Tools:

1. Where mechanical removal of surface coatings constitutes a Level II activity, provide power tools, to the extent feasible, with local HEPA exhaust or dust collector systems to capture the aerosolized lead.

   a. Removal with power blasting tools: For steel coated structures and as approved by the City Representative, power blasting tools may be used for removal of the lead-based paint or hazardous coating materials. To the extent a containment construction will be required to emissions. As part of the HMMP a detailed work plan including an enclosure system with dust collection systems and exhaust ventilation as needed shall be submitted and approved by the City Representative prior to using this method.

   b. Removal with Power Washing: For industrial facilities or where otherwise approved by the City, power washing may be used for removal of the lead-based paint or contamination. Use of this method requires construction of containment, water collection system, a filtering system, and proper disposal of the

wastewater. Adequately protect adjoining sensitive materials and equipment from damage or inclusion within the lead abatement waste. Deactivate electrical systems or adequately protect them prior to the power washing. A detailed work plan including an enclosure system shall be submitted and approved by the City Representative prior to conduct such activities.

c. Removal with Sodium Bicarbonate Blasting: For areas requiring complete removal of all coating residues, use of sodium bicarbonate blasting may be used to supplement scraping or chemical stripping. Use of this method requires construction of containment and filtering system to segregate activities and waste from active work areas. Adequately protect adjoining sensitive materials and equipment from damage or inclusion within the lead abatement waste. Deactivate electrical systems or adequately protect them prior to the water and sodium bicarbonate blasting. A detailed work plan including enclosure shall be submitted and approved by the City Representative prior to such activities.

U. Removal of lead containing jacketed telephone cable:

1. Removal, handling and disposal of lead jacketed telephone cables that may be encountered during demolition activities shall be conducted in accordance with the Cal/OSHA's Construction Lead Standards 8 CCR 1532.1 and CDPH Regulation 17 CCR Section 3500 through 36100. This includes, isolation controls, personal protective procedures and dust controls

2. Prevent dust generated from trimming, cutting and otherwise manhandling lead sheathed telephone cables, dust from deconstructing and hauling off outmoded equipment and dust from soldier waste deposited on floors.

3. Isolate and remove in its entirety each cable designated for removal. Use appropriate equipment and work practices to prevent lead releases. If at all feasible remove the cables using hand electrical shear tools with local HEPA exhaust or dust collector systems to capture the aerosolized lead. To further minimize lead dust during the cutting, apply isolation materials such as foam or "Vaseline" in the entire area of the cutting.

4. Segregate, containerize, and characterize the electrical cables for waste disposal

V. Transite Wall and Ceiling Board:

1. Remove transite board using wet cleaning methods and HEPA vacuuming. Avoid unnecessary sawing and breakage. Take out as whole sheets, if possible. Remove debris remaining at the nails, screws, or other attachments to the studs and joists. Scrape residue remaining on studs or joists flush with the surface of these materials, if these materials are not scheduled for demolition. Continually mist the air with an airless sprayer or Hudson sprayer to lockdown suspended particulate

2. Clean up debris from pipe insulation, fireproofing, acoustical insulation, or other sources (as applicable), which may exist on the topside of the studs or within the wall or ceiling cavity.

3. Clean up the area and dispose of the asbestos-containing waste. Panels may be wrapped in burlap or cardboard, prior to bagging, to protect against penetrating the disposal wrapping.

W. Transite Pipelines, Ducts, Breechings, or Flues:

1. Remove using full isolation procedures satisfying the requirements of Cal/OSHA Regulation 8 CCR 1529, Work Class II.

2. Remove transite materials using wet cleaning methods and HEPA vacuuming. Avoid unnecessary sawing and breakage. Take out as whole lengths, if possible, cutting at the hanger supports and wrapping the separated sections in a double layer of polyethylene sheeting [note that water penetration of this material is usually minimal].

X. Underground transite piping or pipe insulation:

1. Carefully excavate the areas identified for the underground utility or with potential to encounter underground piping. Using wet methods mist the excavated areas, as the pipe gets uncovered. To the extent feasible provide an enclosure for removal as required to control airborne fibers.

2. Using wet methods and HEPA vacuuming techniques, remove pipe intact to the extent feasible. Cutting abrading or breaking the pipe shall be prohibited. Immediately place pipe in polyethylene bag or wrap in polyethylene and label the waste.

3. At the end of each work shift, all removed pipe shall be transferred to a closed receptacle

4. Clean up the regulated area and dispose of the asbestos-containing waste. Duct or flue edges may be wrapped in burlap or cardboard, prior to polyethylene sheeting, to protect against penetrating the disposal wrapping.

5. Dispose of transite as Category 2 non-friable waste, double wrapping intact segments in six (6)-mil polyethylene sheeting.

Y. For Exterior Vapor Barrier or Expansion Joint:

1. Cordon area and set up drop cloths on the ground under the removal area and abate using wet methods. Seal vents, windows, etc. with one layer of six (6) mil polyethylene sheeting as a critical barrier. HEPA-vacuum surrounding area and drop cloths before final visual clearances.

Z. PCBs and Mercury Containing Lamps

1. Disassemble all light fixtures to visually examine the ballasts; ballasts that are not labeled as non-PCB shall be collected and disposed of as PCB-waste. Collect fluorescent tubes for disposal / recycling as mercury containing wastes.

2. Handling and Disposal of Lamps

   a. Spent fluorescent and other mercury-containing lamps shall be considered a hazardous waste as per the California Department of Health Services.

   b. Ship lamps to a commercial recycler (e.g., Mercury Technologies) where they are to be crushed and the mercury reclaimed.

   c. Comply with DOT requirements for manifests, with evidence of proper disposal provided to the City, including a log of shipping dates and quantities.

   d. Remove mercury fluorescent lights and load into secured cardboard boxes for shipment to prevent unnecessary breakage.

   e. In the event of lamp breakage, clean-up broken glass and debris immediately, using a HEPA-filtered vacuum for final clean up.

AA. Loose Debris Cleanup:

1. Construction operations may occasionally disturb loose and peeling paints outside the immediate work area through building vibration or other means. All such loose paint and debris shall be cleaned-up daily using a HEPA-filtration vacuum. Provide adequate protection to offset future disturbances by abating or otherwise sealing affected surfaces.

2. Clean-up background or construction-related dusts from demolition of lead-coated elements or other contaminant sources using wet methods and HEPA-filtered vacuums.

3. Do not dry sweep.

BB. Stabilization of Loose & Peeling Paints**:**

1. Post notices, including CDPH, Cal/OSHA and EPA RR&P notices, as applicable, prior to start of work.

2. Manually scrape and stabilize loose and peeling paints prior to demolition of painted substrates using drop cloths, wet methods, and HEPA vacuums for dust control in compliance with Cal/OSHA regulation 8 CCR 1532.11 and the EPA's RR&P rules. Avoid dry sweeping. Burning of paints, use of heat guns greater than 1,100 deg. F, and use of leaf blowers or compressed air for clean-up are prohibited

3. Use of mechanical equipment, such as sanders, grinders and needle guns without a HEPA-vacuum attached thereto are prohibited for sites with children under the age of 6 as occupants (per EPA's RR&P rules).

4. Work areas shall be cleaned-up of lead hazards daily before leaving the site.

CC. For Mechanical Sanding:

1. Sanding is prohibited without written authorization from the City.

2. If approved, work areas requiring mechanical sanding or stripping of painted surfaces with any lead content shall be fully contained with polyethylene dust barriers, establishing negative pressure of the zone, and using HEPA-filtered tools and other dust control procedures as outlined under 8 CCR 1532.1.

DD. Prime or Painted Structural Steel Spot Abatement

1. Manually scrape paints and primers at locations of new welded connections as shown on Structural Drawings. Use an approved chemical stripper with "low odor" and scrape using manual, wet methods, drop cloths, visqueen barriers, and HEPA vacuums for dust control in compliance with Cal/OSHA regulation 8 CCR 1532.1, CDPH regulation 17 CCR Section 35001 through 36100 and the EPA's RR&P rules, as applicable.

2. Avoid dry sweeping, burning of paints, use of heat guns greater than 1,100 deg. F, and use of leaf blowers or compressed air for clean-up. Use of mechanical equipment, such as sanders, grinders and needle guns without a HEPA-vacuum attached thereto are prohibited for this site per the EPA RR&P rules. Work areas shall be cleaned-up of lead hazards daily before leaving the site.

3. Note that 8 CCR 1537(c) and SFPUC require stripping of any painting coating for a distance of at least 12-inches from the area of heat application (torching/welding, etc.), or workers shall be required to use supplied air respirators in accordance with 8 CCR 1532.1 or the provisions of 8 CCR 1536(b)(c). Dispose of stripper and contaminated drop cloths as hazardous waste.

4. Ventilate the abatement zone as required by the stripper manufacturer. Workers shall wear combination organic (charcoal) and HEPA filter respirator cartridges, as necessary.

5. Note that despite the quality of abatement, some minor residues may remain on structural elements as well as paints and primers on inaccessible surfaces, which cannot be abated. During the welding phase, the Contractor shall operate “smog hogs” or localized exhaust units in the vicinity of welding work to prevent build-up of airborne lead contaminants within occupied and other construction areas. Localized exhaust units shall exhaust outdoors.

6. For Disposal & Cleanup: Demolish and dispose of intact painted substrates as non-hazardous waste. Characterize and dispose of loose and peeling paint debris, chemical strippers, rags, etc. as potentially hazardous waste. Clean-up drop cloths and HEPA vacuum loose and peeling chips and debris daily for all work areas before leaving the site.

EE. Encapsulation Procedures

1. Upon notice to proceed from the City, apply encapsulant.

2. Prepare and apply encapsulant in accordance with the manufacturer's specification, using airless spraying equipment. Because application by spraying could cause dissemination of residual fibers, encapsulant must be applied with as much caution and at as low a nozzle pressure as possible.

3. Apply encapsulant in 2 coats with a tint to be approved by the City. Apply the first coat as a penetrating encapsulant, allowing it to properly dry. Then apply a second coat of bridging encapsulant.

4. Apply penetrating type encapsulant to provide complete penetration of asbestos fireproofing surfaces exposed during the controlled renovation activities in accordance with manufacturer's recommendation. Apply encapsulant using airless spray equipment.

FF. Daily Cleaning

1. Clean asbestos-containing debris and contaminated water from the work area daily using wet methods and HEPA vacuuming equipment. Place asbestos debris and water in bags, sealed and either stored or removed from the work area.

2. Worker decontamination enclosure system; clean the clean room, shower, and equipment room daily or as required more frequently to maintain acceptable clean room perimeter air sample total fiber counts. Keep the clean room floor dry and free of any waste. Repair and replace the clean room flap whenever damaged or torn.

GG. Bagging, Drumming, and Handling Waste:

1. Protect all workers handling waste in full body protective clothing and at least a respirator approved by NIOSH for protection against asbestos. Workers transporting clean, sealed drums or other clean, sealed waste may handle waste with less protective clothing if approved by the City’s or its Environmental Consultant.

2. Do not allow asbestos waste to dry out prior to sealing bags.

3. Seal bags of asbestos-containing waste with tape within the work area. Seal bags with a goose neck fold: first twist bag and seal top opening with tape; fold remaining bag extension over the first tape enclosure and re-tape around top of bag there by double sealing the top opening. No free-flowing water shall be present at any time in

the bag. If free-flowing water is present, the Contractor shall add absorbent into the bags to remedy the condition.

4. Wrap and seal waste treated as asbestos contaminated that cannot be contained in bags in 6-mil clear polyethylene plastic or other impermeable material approved by the City. Wrap objects that will tear, cut, or damage the integrity of the plastic in a protective material such as canvas or burlap to reduce the potential for damage to the plastic or other impermeable material

5. Sealing Waste from Glove Bag with Cut-Out: Wrap sections of piping covered with ACM in a minimum of two layers of 6-mil polyethylene sheeting before removal from the work zone.

6. While in the work area, decontaminate bags and/or wrapped objects of any bulk debris by wet wiping. Utilizing the equipment decontamination enclosure system, pass the bags and/or wrapped objects into the washroom where they will be thoroughly decontaminated by wet sponging with amended water. Decontaminated bags will then be passed directly into the holding room where they will immediately be placed in a second clean bag and sealed with tape.

7. Wrap and seal decontaminated objects in a second layer of impermeable material.

8. Deposit bags with friable hazardous waste into clean sealable drums for transport. Seal filled drums. Mark drums with the label prescribed by the EPA, including the Generator I.D. Number or source location and the Waste Manifest Number.

9. Deposit bags into clean sealable dumpster for transport, except non-friable roofing which can be deposited directly into double-lined waste dumpsters for disposal at a landfill accepting Category I, non-friable ACM.

10. The City's Representative must be notified prior to removing materials from the work area and prior to loading waste into dumpsters or other transport containers for removal from the site. At least 24 hours of advance written notification must be given.

END OF SECTION