

TECHNICAL SPECIFICATIONS

PROJECT # 06307

SUNOL COMMUNITY SCHOOL RESTROOMS UPGRADE & SITE WORK

**258 SUNOL STREET
SAN JOSE, CA 95126**

SEPTEMBER 28TH, 2017

SANTA CLARA COUNTY OFFICE OF EDUCATION

**1290 RIDDER PARK DRIVE MC254
SAN JOSE, CA 95131-2304**

Prepared by Architect:

Artik Art & Architecture
394-A Umbarger Road
San Jose, CA 95111
(408) 224-9890
Artik #02422

SIGNATURE SHEET

FOR

**SUNOL COMMUNITY SCHOOL
RESTROOMS UPGRADE & SITE WORK**

258 SUNOL STREET
SAN JOSE, CA 95126

SANTA CLARA COUNTY OFFICE OF EDUCATION

Project Number: 06307



ARTIK ART AND ARCHITECTURE
Architect



PEOPLES ASSOCIATES, INC.
Structural Engineer



ALIANCE ENGINEERING CONSULTANTS
Electrical Engineer

DIVISION OF THE STATE ARCHITECT



H & M MECHANICAL GROUP
Mechanical Engineer

DIVISION OF THE STATE ARCHITECT
IDENTIFICATION STAMP

APPL. 01-116854

AC gn FLS Ac SSS K.F.K

DATE SEP 28 2017

**SECTION 02 41 13
SELECTIVE SITE DEMOLITION****1.00 GENERAL****1.01 RELATED DOCUMENTS**

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

1.02 SUMMARY

- A. This Section requires the selective removal and subsequent off-site disposal of, but not limited to, the following:
 - 1. Portions of site improvements indicated on drawings and as required to accommodate new construction.
 - 2. Removal and protection of existing fixtures, materials, and equipment items indicated "salvage."

1.03 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Schedule indicating proposed sequence of operations for selective demolition work to Architect for review prior to start of work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.
 - 1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations, if any.
 - 2. Coordinate with Owner's continuing occupation, if any, of portions of existing building and with Owner's partial occupancy, if any, of completed new addition.
- C. Photographs of existing conditions of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. File with Architect prior to start of work.

1.04 JOB CONDITIONS

- A. Occupancy: Owner will occupy portions of the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities that will affect Owner's normal operations.
- B. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.
 - 1. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable. However, minor variations within structure may occur by Owner's removal and salvage operations prior to start of selective demolition work.
- C. Partial Demolition and Removal: Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed.
 - 1. Storage or sale of removed items on site will not be permitted.
- D. Environmental Controls: Comply with governing regulations pertaining to environmental protection.
 - 1. Lead in Construction: All contractors shall comply with Title 8, California Code of Regulations (CCR), Section 1532.1, when abating lead relating to demolition of remodel activity in all public buildings. Workers must be trained by the Department of Health Services (DHS) accredited trainer provider and certified by DHS. Exposure assessment (air monitoring) must be performed in all workplaces where employees may be exposed to lead. Exposure assessment is an eight hour period when air monitoring takes place to determine permissible exposure limit for each activity taken.
- E. Protections: Provide temporary barricades and other forms of protection to protect Owner's personnel and general public from injury due to selective demolition work.
 - 1. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to occupied portions of building.
 - 2. Erect temporary covered passageways as required by authorities having jurisdiction.
 - 3. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities or work to remain.
 - 4. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
 - 5. Protect floors with suitable coverings when necessary.

6. Construct temporary insulated dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dust proof doors and security locks.
 7. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
 8. Remove protections at completion of work.
- F. Damages: Promptly repair damages caused to adjacent facilities by demolition work.
- G. Traffic: Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
1. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- H. Flame Cutting: Do not use cutting torches for removal until work area is cleared of flammable materials. At concealed spaces, such as interior of ducts and pipe spaces, verify condition of hidden space before starting flame-cutting operations. Maintain portable fire suppression devices during flame-cutting operations.
- I. UtilityServices: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.
1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by Owner/Occupant. Provide temporary services during interruptions of existing utilities, as acceptable to governing authorities.
 2. Maintain fire protection services during selective demolition operations.
- J. Dust Control: Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection.
1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

2.00 PRODUCTS (Not Applicable)

3.00 EXECUTION

3.01 PREPARATION

- A. General: Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain.
 - 1. Cease operations and notify Architect immediately if safety of structures, or improvements to remain appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
 - 2. Cover and protect furniture, equipment, and fixtures from soilage or damage when demolition work is performed in areas where such items have not been removed.
 - 3. Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes to occupied portions of the building.
 - a. Where selective demolition occurs immediately adjacent to occupied portions of the building, construct dust-proof partitions of minimum 4-inch studs, 5/8-inch drywall (jointstaped) on occupied side, 1/2-inch fire-retardant plywood, or equivalent, on demolition side and fill partition cavity with sound-deadening insulation, or as otherwise directed.
 - b. Provide weatherproof closures for exterior openings resulting from demolition work.
 - 4. Locate, identify, stub off, and disconnect utility services that are not indicated to remain.
 - a. Provide bypass connections as necessary to maintain continuity of service to occupied areas of building.

3.02 DEMOLITION

- A. General: Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.
 - 1. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.
 - 2. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.
 - 3. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.
 - 4. Demolish foundation walls to a depth of not less than 12 inches below lowest foundation level. Demolish and remove below-grade wood or metal construction. Break up below-grade concrete slabs.
 - 5. For interior slabs on grade, use removal methods that will not crack or structurally disturb adjacent slabs or partitions. Use power saw where possible.
- B. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the

conflict. Submit report to Architect in written, accurate detail. Pending receipt of directive from Architect, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

3.03 SALVAGED MATERIALS

- A. Salvaged Items: Where indicated on Drawings as "Salvage - Deliver to Owner," carefully remove indicated items, clean, store, and turn over to Owner and obtain receipt.
 - 1. Historic artifacts, including cornerstones and their contents, commemorative plaques and tablets, antiques, and other articles of historic significance, remain property of Owner. Notify Architect if such items are encountered and obtain acceptance regarding method of removal and salvage for Owner.
 - 2. Carefully remove, clean, and deliver to Owner the following items:
 - a. As indicated on the Construction Documents.

3.04 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove from building site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose off site.
- B. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
 - 1. Burning of removed materials is not permitted on project site.

3.05 CLEANUP AND REPAIR

- A. **General:** Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave interior areas broom clean.
- B. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION 02 41 13

SECTION 02 41 19 - SELECTIVE DEMOLITION**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:

- 1. Demolition and removal of selected portions of building or structure.

- B. Related Requirements:

- 1. Section 01 11 00 "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
 - 2. Section 01 73 00 "Execution" for cutting and patching procedures.
 - 3. Section 31 10 00 "Site Clearing" for site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

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

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Pre-demolition Photographs or Video: Submit before Work begins.
- C. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that

recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

- D. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.6 CLOSEOUT SUBMITTALS

- A. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.7 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.8 FIELD CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- D. Storage or sale of removed items or materials on-site is not permitted.
- E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
- F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
 - 1. Comply with requirements for existing services/systems interruptions specified in Section 01 10 00 "Summary."
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.

- c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
- C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 PREPARATION

- A. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
- 1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
- 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain adequate ventilation when using cutting torches.
 - 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 9. Dispose of demolished items and materials promptly.
- B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site.
1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 4. Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

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

END OF SECTION 02 41 19

SECTION 06 10 00 – ROUGH CARPENTRY**PART I – GENERAL****1.01 DESCRIPTION OF WORK**

- A. Summary: The work included under this section consists of furnishing all material, supplies, equipment, tools, transportation and facilities and performing all labor and services necessary for, required in connection with or properly incidental to furnishing and installing rough carpentry, as described in this section of the specifications, shown on the accompanying drawings, or reasonably implied therefrom.
- B. Work included:
 - 1. Furnishing and installing wood framing and sheathing systems including manufactured wood products and or trusses.
 - 2. Furnishing and installing glue-laminated beams
 - 3. Wood furring, blocking and nailers.
 - 4. Furnishing and installing light gage metal connectors
 - 5. Backing for wall mounted equipment, railings, toilet partitions, toilet accessories, etc.
 - 6. Rough hardware, including tie-downs, post caps, metal straps, etc.
 - 7. Acoustical sealant, where indicated, at wood plates and plywood.
 - 8. Prefabricated wood products
 - 9. Temporary bracing

1.02 REFERENCE STANDARDS (latest editions apply)

- A. AITC- American Institute of Timber Construction Standards
 - 1. 103 – Standard for Structural Glued Laminated Timber
 - 2. 110 – Standard Appearance Grades for Structural Glued Laminated Timber.
 - 3. 111 – Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection.
 - 4. 113 – Standard for Dimensions of Glued Laminated Structural Members.
 - 5. 115 – Standard for Fabricated Structural Timber
- B. ANSI- American National Standards Institute
 - 1. ANSI/AITC A190.1 Structural Glued Laminated Timber

2. ANSI/ASME B18.2.1 Square and Hex Bolts and Screws (Inch Series)
3. ANSI/ASME B18.6.1 Wood Screws (Inch Series)
- C. APA- American Plywood Association Product Standard PS 1-09.
- D. ASTM- American Society for Testing and Materials: D5055-05, Establishing and monitoring Structural Capacities of Prefabricated Wood I Joists.
- E. ASTM A307, "Specification for Carbon Steel Externally Threaded Standard Fasteners"
- F. ASTM F 1667-05, "Standard specification for Driven Fasteners: Nails, Spikes, and Staples".
- G. AWWA- American Wood Preservers Association Standards
- H. AWPI- American Wood Preservers Institute LP-2
- I. ICC- International Code Council, Inc.
 1. CBC- California Building Code, 2016 Edition
- H. FS- Federal Specifications
- I. TPI- Truss Plate Institute: Design Specification for Metal Plate Connected Wood Trusses.
- J. WCLIB- West Coast Lumber Inspection Bureau, Grading Rule No. 17
 1. ASTM A307, "Specification for Carbon Steel Externally Threaded Standard Fasteners"
 2. W.C.L.I.B., "Standard Grading and Dressing Rules No. 17"
 3. ASTM F 1667-00, "Standard Specification for Driven Fasteners: Nails, Spikes, and Staples"

1.03 QUALITY ASSURANCE

- A. Codes and Standards: Comply with all Federal, State and Local Codes and Safety Regulations. In addition, comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
 1. "California Building Code", current governing edition.
 2. National Forest Products Association, "National Design Specification for Wood Construction".
 3. American Plywood Association, "U.S. Product Standard PS 2-10".
 4. Laminated Members should be in conformance with the Standard Specifications for Structural Glue-Laminated Timber per ANSI/AITC A190.1-2012.

B. Grade Marks:

1. All framing lumber shall be identified by the grade stamp of the West Coast Lumber Inspection Bureau.
2. All sheathing shall be identified as to species, grade, and glue type and shall bear the identification grade mark of APA. All glu-lam beams shall be stamped with an AITC product quality mark.

C. Certificates of Conformance: The Contractor shall provide AITC Certificate of Conformance for glu-lam beams in accordance with the requirements of Section 1.04, "Submittals", of this Specification Section.

1.04 SUBMITTALS

- A. Shop drawings of glue-laminated beams plus AITC or equal certificate of conformance with product standard ANSI/AITC 190.1
- B. Shop drawings of prefabricated wood I joists including:
 1. Plan layout of members and bridging, design loads and installation instructions.
 2. Details of member connections, stiffeners, blocking and web openings.
 3. Structural calculations stamped and signed by California Registered Civil Engineer.
- C. Product information for rough hardware.

- 1.05 Store lumber and plywood off ground in manner to insure proper ventilation and protection from weather; and to prevent damage by either decay or insects. Store plywood under cover and cover lumber as required to avoid twisting and warping.
- 1.06 Coordinate work of this Section with work by others. Check lines and levels indicated on such other work as has been completed, before commencing work of this Section. Report discrepancies in writing to the Owner for correction and adjustment, or in the event of failure to do so, correct errors without additional cost to the Owner.
- 1.07 Install temporary bracing as required. Make proper provision to take care of stresses resulting from construction loads, whenever piles of materials, erection equipment or other loads are carried by frame during its erection.

PART II – PRODUCTS

2.01 WOOD: Materials shall conform to grades and grading rules as hereinafter specified. Each piece of lumber and plywood shall be grade-stamped or certified by a competent agency approved by the Owner.

- A. Framing Lumber: Douglas Fir – Larch conforming to "WCLIB Standard Grading and Dressing Rules No. 17" as follows:
 - 1. Structural Light Framing: 2" to 4" thick 2" to 6" wide D.F. No. 1
 - 2. Structural Joists & Planks: 2" to 4" thick, 6" and wider D.F. No. 1 or better
 - 3. Beams & Stringers: 5" and thicker, Rectangular width more than 2" greater than thickness D.F. No. 1, free of heart centers
 - 4. Posts & Timbers: 5" x 5" and larger, width not more than 2" greater than thickness D.F. No. 1 free of heart centers
 - 5. Sills: Pressure treated D.F. No. 1, AWPB Stamped, Ammoniacal Copper Quat (ACQ) treated AWPB Standard C2, minimum 4/10" penetration, incised
- B. Plywood: (APA Grade) Structural I, with exterior glue, 5-ply construction, all Group 1 wood, minimum span rating 24/0 for roof sheathing, 48/24 for floor sheathing, and 32/16 for wall sheathing.
- C. Glued Laminated Timber
 - 1. Lumber; Douglas Fir (Laminating Grades), Grade Combination No. A ($F_b = 2,400$ psi) graded in accordance with the Standard Grading and Dressing Rules of WCLIB.
 - 2. Glues: Exterior type adhesive conforming to ASTM D2559, resin adhesive of phenol, or melamine base applied in accordance with the manufacturer's recommendation.
 - 3. Fabrication shall comply with the Standards established by the American Institute of Timber Construction, (AITC 103, 110, 113, 115 and ANSI / A190.1)
 - 4. Provide extra length of at least six (6) inches at each end for field trim of all members, or verify field dimensions prior to fabrication of members to ensure proper fit.
 - 5. Glu-lam beam fabrication shall be continuously inspected by a DSA certified inspector per 1705A.5.4 of the 2016 CBC, where required.
- D. Laminated Strand Lumber (LSL): 1.55E "Timberstrand" as manufactured by Weyerhaeuser Co. or approved equal.
- E. Laminated Veneer Lumber (LVL): 1.9E "Microlam" as manufactured by Weyerhaeuser Co. or approved equal.
- F. Parallel Strand Lumber (PSL): 2.0E "Parallam" as manufactured by Weyerhaeuser Co. or approved equal.

G. Additional Grading Requirements

1. In order to qualify as "structural lumber", each piece including plywood, shall be marked with the grade of the lumber by some competent and reliable organization whose regular business is to establish lumber grades and whose trade-mark shall also appear on each piece; except that, a certificate from such an organization may be accepted in lieu of such grade and trade-marks. All plywood must be grade stamped on each piece with the APA trade-mark.
2. There shall be no boxed heart in any framing lumber 4" and larger in the least dimension.

2.02 PRESERVATIVE TREATMENT

- A. Use waterborne preservatives complying with AWPI LP-2.
- B. All preservative treated lumber shall be retreated where cut on site.

2.03 ROUGH HARDWARE

Nails, bolts, nuts, washers, lag bolts, screws, anchor and other fastenings as shown or as required for complete installation. Galvanized or cadmium-plate for exterior work. Comply with the following specifications:

- A. Wire Nails: Common. Plywood nails are acceptable at diaphragms and walls. Provide minimum penetration as required for common nails.
- B. Bolts, Nuts, ASTM A307, (upset threads are prohibited)
- C. Lag Screws and Lag Bolts: FF-B-561.
- D. Wood Screws: FF-S-111.
- E. Framing Clips, Boots, Hangers, hold-downs, straps etc.: by Simpson Strong Tie or approved equal.

- 2.04 GLUE: AFG – 01 approved. PL Premium" polyurethane construction adhesive by Chem Pex, Inc., or equal. Install adhesive per manufactures recommendations.

PART III – EXECUTION**3.01 GENERAL FRAMING**

- A. All framing operations shall conform to the requirements of the C.B.C.
- B. Joists, rafters and beams shall be cut as required to provide a full even and horizontal seating on the support, unless otherwise shown. Do not overcut.
- C. Where framing members slope, cut or notch the ends as required to give uniform bearing surface.
- D. Notches and bored holes in joists and beams shall be limited as shown on the drawings.

3.02 FRAMING FOR PIPES

- A. Frame members for passage of pipes and ducts to avoid cutting structural members. Do not cut, notch or bore framing members for passage of pipes or conduits without architect's authorization and DSA's approval.
- B. Pipes 1" diameter or less may pass through a neatly bored hole in the center of the wall plates. Hole location is subject to the Architect's acceptance.

3.03 BLOCKING: Provide solid blocking in all walls for wall mounted items.

3.04 FIRE STOPS: Provide 2" nominal fire stops in conformance with Section 708.2 of the CBC.

3.05 FURRING: Provide furring, stripping, blocking, backing and grounds where necessary or indicated to support, or to furnish suitable spacings for finish materials and accessories.

3.06 NAILING:

- A. All nailing shall conform to CBC Table 2304.10.1, except where more stringent requirements are shown on drawings.
- B. Penetration of nails or spikes into piece receiving point shall be not less than 1/2 length of nail or spike, except that 16 penny nails may be used to connect pieces of 2" thickness.
- C. Drive nails and spikes no closer together than 2/3 their length nor closer to edge of member than 1/2 their length, except when detailed otherwise.
- D. Place nails without splitting wood. Pre-drill holes whenever nailing tends to split wood or plywood. Replace split members.
- E. Use of machine nailing is subject to a satisfactory job site demonstration. Authorization is subject to continued satisfactory performance. If nail heads penetrate the outer ply of plywood more than would be normal for a hand hammer or if the minimum allowable edge distances are not maintained the performance will be deemed unsatisfactory.

3.07 BOLTS AND LAG SCREWS:

- A. Provide bolts and lag screws, bearing on wood, with malleable iron or steel plate washers of sizes indicated under heads and nuts. All nuts and screws shall be tightened when placed and re-tightened at completion of the job or immediately prior to closing with finish construction. Nuts shall be secured against loosening.
- B. Except where otherwise indicated on the details, bore holes for bolts with a bit 1/32" to 1/16" larger than nominal diameter as the bolt.
- C. Bore lag screw holes the same diameter and depth as shank, continue hole to depth equal to length of lag screw and with a diameter equal to 40% to 70% of the diameter of the shank.
- D. Screw all lag screws; do not drive into place. Embed threaded portion of lag screws in each timber a minimum of seven (7) times their shank diameter.

- 3.08 PRESERVATIVE TREATMENT: Treat all framing in direct contact with concrete or masonry construction with wood preservative, as follows:
- A. Wood bucks and nailing blocks: Dip in preservative 15 minutes prior to incorporation in concrete.
 - B. All treated lumber shall be marked or branded.
- 3.09 Glue Plywood Floor Sheathing to supporting members
- 3.10 PREFABRICATED WOOD: Install prefabricated wood products in accordance with the recommendations of the manufacturer. All trusses and I-joists must be securely braced during erection and after permanent installation. Erection bracing shall hold trusses and I-joists straight and plumb and in safe condition until decking and permanent bracing has been fastened forming a structurally sound framing system. All erection and permanent bracing shall be installed and all trusses permanently fastened before application of any loads. Do not impose construction loads which cause stresses beyond design limits. Materials used in bracing are to be furnished by the erection contractor.
- 3.11 REMOVAL OF DEBRIS: Remove all wood, including form lumber, chips, shavings and sawdust in or on the ground from the area under the floor. No wood shall be buried in any fill.

END OF SECTION

SECTION 066400 - PLASTIC PANELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Plastic sheet paneling.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For plastic paneling and trim accessories, in manufacturer's standard sizes.

1.4 QUALITY ASSURANCE

- A. Testing Agency: Acceptable to authorities having jurisdiction.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install plastic paneling until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.

2.2 PLASTIC SHEET PANELING

- A. Glass-Fiber-Reinforced Plastic Paneling: Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D 5319. Panels shall be USDA accepted for incidental food contact.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Marlite.
 - b. Nudo Products, Inc.
2. Low-Emitting Materials: Paneling shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services) "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
3. Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E 84. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
4. Nominal Thickness: Not less than 0.12 inch (3.0 mm).
5. Surface Finish: Molded pebble texture.
6. Color: As selected by Architect from manufacturer's full range.

2.3 ACCESSORIES

- A. Trim Accessories: Manufacturer's standard vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
 1. Color: Match panels.
- B. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.
- C. Adhesive: As recommended by plastic paneling manufacturer and that complies with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services) "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Sealant: Mildew-resistant, single-component, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 079200 "Joint Sealants."
 1. Sealant shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services) "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove loose or soluble paint, and other materials that might interfere with adhesive bond.
- B. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.
- C. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.
- D. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- E. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels.
 - 1. Mark plumb lines for accurate installation.
 - 2. Locate trim accessories to allow clearance at panel edges according to manufacturer's written instructions.

3.3 INSTALLATION

- A. Install plastic paneling according to manufacturer's written instructions.
- B. Install panels in a full spread of adhesive.
- C. Install trim accessories with adhesive.
- D. Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.
- E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.
- F. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 066400

SECTION 07 21 00 - THERMAL INSULATION**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Glass-fiber blanket insulation.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

1.5 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS**2.1 GLASS-FIBER BLANKET INSULATION**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. [CertainTeed Corporation.](#)
 2. [Johns Manville.](#)
 3. [Owens Corning.](#)
 4. Or equal.
- B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
- C. Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (reflective faced), Class B (faced surface with a flame-propagation resistance of 0.12 W/sq. cm); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
 5. For wood-framed construction, install blankets according to ASTM C 1320 and as follows:
 - a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
- C. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
 2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.4 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

3.5 INSULATION SCHEDULE

- A. Insulation Type: Unfaced, glass-fiber blanket insulation.
1. Use at all interior walls (R13) for sound insulation.
- B. Insulation Type: Faced, glass-fiber blanket insulation.
1. Use at all exterior walls (R19) and roof (R30) for thermal insulation.

END OF SECTION 07 21 00

SECTION 07 92 00 - JOINT SEALANTS**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Latex joint sealants.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Sustainable Design Submittals:
 - 1. Product Data: For sealants, indicating VOC content.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.
- B. Sample Warranties: For special warranties.

1.5 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.

2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.6 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content: Sealants and sealant primers shall comply with the following:
 1. Architectural sealants shall have a VOC content of 250 g/L or less.
 2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
 3. Sealants and sealant primers for nonporous substrates shall have a VOC content of 775 g/L or less.
- C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Silicone, Acid Curing, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant: ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. **Products:** Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; DOW CORNING® 999A SILICONE GLAZING SEALANT.
 - b. Polymeric Systems, Inc; PSI-601.
 - c. Sika Corporation; Joint Sealants; Sikasil-GP.
 - d. Or equal.

2.3 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 25, T, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Uses T and NT.

1. **Products:** Subject to compliance with requirements, provide one of the following:
 - a. BASF Corporation; Construction Systems; MasterSeal NP 1 (Pre-2014: Sonolastic NP1).
 - b. LymTal International Inc; Iso-Flex 330.
 - c. Or equal.

2.4 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation; Construction Systems.
 - b. May National Associates, Inc.; a subsidiary of Sika Corporation.
 - c. Sherwin-Williams Company (The).
 - d. Tremco Incorporated.
 - e. Or equal.

2.5 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.

4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form

smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
 1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Tile control and expansion joints.
 - c. Vertical joints on exposed surfaces of concrete walls.
 - d. Other joints as indicated on Drawings.
 2. Joint Sealant: Urethane, S, NS, 25, NT.
- B. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.
 1. Joint Locations:
 - a. Control joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints between interior wall surfaces and frames of interior doors, windows and elevator entrances.
 - c. Other joints as indicated on Drawings.
 2. Joint Sealant: Acrylic latex.
- C. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.
 - c. Other joints as indicated on Drawings.
2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.

END OF SECTION 07 92 00

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section includes hollow-metal work.
- B. Related Requirements:
 - 1. Section 08 71 00 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 2. Locations of reinforcement and preparations for hardware.
 - 3. Details of each different wall opening condition.
 - 4. Details of anchorages, joints, field splices, and connections.
 - 5. Details of accessories.
 - 6. Details of conduit and preparations for power, signal, and control systems.

HOLLOW METAL DOORS AND FRAMES

- C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - 1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
- B. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.2 INTERIOR DOORS AND FRAMES

- A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3.
 - 1. Physical Performance: Level A according to SDI A250.4.

2. Doors:
 - a. Face: Uncoated, cold rolled steel sheet, minimum thickness 0.032 inch (0.8 mm).
 - b. Edge Construction: Model 2, Seamless
 - c. Core: Manufacturer's standard kraft-paper honeycomb.
 - d. Thickness: 1-3/4 inches (44.5 mm).
3. Frames:
 - a. Materials: Uncoated, steel sheet, minimum thickness of 0.053 inch.
 - b. Construction: Face welded.
4. Exposed Finish: Prime.

2.3 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

- A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Maximum-Duty Doors and Frames: SDI A250.8, Level 4.
 1. Physical Performance: Level A according to SDI A250.4.
 2. Doors:
 - a. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch (1.0 mm), with minimum A40 (ZF120) coating.
 - b. Construction: Model 2 Seamless.
 - c. Core: Manufacturer's standard kraft-paper honeycomb.
 3. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch, with minimum A40 coating.
 - b. Construction: Face welded.
 4. Exposed Finish: Prime.

2.4 HOLLOW-METAL PANELS

- A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies.

2.5 LOUVERS

- A. Provide louvers for interior doors, where indicated, which comply with SDI 111, with blades or baffles formed of **0.020-inch-** (0.5-mm-) thick, cold-rolled steel sheet set into **0.032-inch-** (0.8-mm-) thick steel frame.
 - 1. Sightproof Louver: Stationary louvers constructed with inverted-V or inverted-Y blades.
 - 2. Lightproof Louver: Stationary louvers constructed with baffles to prevent light from passing from one side to the other.
- B. Form corners of moldings with hairline joints. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames

2.6 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than **0.042 inch** thick or as indicated on drawings.
 - 2. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum **3/8-inch-** diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

2.7 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), **04Z** coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. Grout: ASTM C 476, except with a maximum slump of **4 inches**, as measured according to ASTM C 143/C 143M.
- G. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

- H. Glazing: Comply with requirements in Section 08 80 00 "Glazing."
- I. Bituminous Coating: Cold-applied asphalt mastic, compounded for **15-mil** dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.8 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Sidelight Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 - 4. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Stud-Wall Type: Locate anchors not more than **18 inches** from top and bottom of frame. Space anchors not more than **32 inches** o.c. and as follows:
 - 1) Three anchors per jamb up to **60 inches** high.
 - 2) Four anchors per jamb from **60 to 90 inches** high.
 - 3) Five anchors per jamb from **90 to 96 inches** high.
 - 4) Five anchors per jamb plus one additional anchor per jamb for each **24 inches** or fraction thereof above **96 inches** high.
 - b. Postinstalled Expansion Type: Locate anchors not more than **6 inches** from top and bottom of frame. Space anchors not more than **26 inches** o.c.
 - 5. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- C. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

HOLLOW METAL DOORS AND FRAMES

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
- E. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
 2. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 3. Provide loose stops and moldings on inside of hollow-metal work.
 4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.9 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.10 ACCESSORIES

- A. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
- B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-rated openings, install frames according to NFPA 80.
 - b. Install frames with removable stops located on secure side of opening.
 - c. Install door silencers in frames before grouting.
 - d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - e. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - f. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
 - 2. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
 - 3. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
 - 4. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 - 5. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
 - 6. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus **1/16 inch**, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus **1/16 inch**, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus **1/16 inch**, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus **1/16 inch**, measured at jambs at floor.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

HOLLOW METAL DOORS AND FRAMES

- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08 11 13

SECTION 08 31 13 - ACCESS DOORS AND FRAMES**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Access doors and frames for walls and ceilings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Detail fabrication and installation of access doors and frames for each type of substrate.
- C. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 - PRODUCTS**2.1 PERFORMANCE REQUIREMENTS**

- A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
 - 2. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
- B. Flush Access Doors with Concealed Flanges:
 - 1. Assembly Description: Fabricate door to fit flush to frame. Provide frame with gypsum board beads for concealed flange installation.
 - 2. Locations: Wall and ceiling.
 - 3. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage.
 - a. Finish: Factory prime.
 - 4. Frame Material: Same material and thickness as door.
 - 5. Hinges: Manufacturer's standard.
 - 6. Hardware: Lock.
- C. Exterior Flush Access Doors:
 - 1. Assembly Description: Fabricate door to be weatherproof and fit flush to frame. Provide manufacturer's standard 2-inch- thick fiberglass insulation and extruded door gaskets. Provide manufacturer's standard-width frame for surface mounting, proportional to door size.
 - 2. Locations: Wall.
 - 3. Stainless-Steel Sheet for Door: Nominal 0.062 inch, 16 gage.
 - a. Finish: No. 4.
 - 4. Frame Material: Same material, thickness, and finish as door.
 - 5. Hinges: Manufacturer's standard.
 - 6. Hardware: Lock.
- D. Fire-Rated, Flush Access Doors with Concealed Flanges:
 - 1. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release. Provide frame with gypsum board beads for concealed flange installation.
 - 2. Locations: Wall and ceiling.
 - 3. Fire-Resistance Rating: Not less than that of adjacent construction.
 - 4. Temperature-Rise Rating: 450 deg F at the end of 30 minutes.
 - 5. Uncoated Steel Sheet for Door: Nominal 0.036 inch, 20 gage.
 - a. Finish: Factory prime.
 - 6. Frame Material: Same material, thickness, and finish as door.
 - 7. Hinges: Manufacturer's standard.
 - 8. Hardware: Lock.
- E. Hardware:

1. Lock: Cylinder.

2.3 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- D. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304. Remove tool and die marks and stretch lines or blend into finish.
- E. Frame Anchors: Same type as door face.
- F. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.4 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 1. For concealed flanges with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
 2. Provide mounting holes in frames for attachment of units to metal or wood framing.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 1. For cylinder locks, furnish two keys per lock and key all locks alike.

2.5 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Steel and Metallic-Coated-Steel Finishes:
 - 1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
- E. Stainless-Steel Finishes:
 - 1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - 2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - c. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08 31 13

SECTION 08 71 00 DOOR HARDWARE**PART 1 - GENERAL****1.01 RELATED DOCUMENTS**

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

1.02 SUMMARY

- A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.
- B. This Section includes the following, but is not necessarily limited to:
 - 1. Door Hardware, including electric hardware.
 - 2. Storefront and Entrance door hardware.
 - 3. Low-energy door operators plus sensors and actuators.
 - 4. Thresholds, gasketing and weather-stripping.
 - 5. Door silencers or mutes.
- C. Related Sections: The following sections are noted as containing requirements that relate to this Section, but may not be limited to this listing.
 - 1. Division 8: Section - Steel Doors and Frames.
 - 2. Division 8: Section - Wood Doors.
 - 3. Division 8: Section - Aluminum Storefront
 - 4. Division 28: Section - Fire/Life-Safety Systems & Security Access Systems.

1.03 REFERENCES (USE DATE OF STANDARD IN EFFECT AS OF BID DATE.)

- A. 2016 California Building Code, CCR, Title 24.
- B. BHMA – Builders' Hardware Manufacturers Association
- C. DHI – Door and Hardware Institute
- D. NFPA - National Fire Protection Association.
 - 1. NFPA 80 - Fire Doors and Other Opening Protectives
 - 2. NFPA 105 - Smoke and Draft Control Door Assemblies
- E. UL - Underwriters Laboratories.
 - 1. UL 10C - Fire Tests of Door Assemblies
 - 2. UL 305 - Panic Hardware
- F. WHI - Warnock Hersey Incorporated

G. SDI - Steel Door Institute

1.04 SUBMITTALS & SUBSTITUTIONS

- A. General: Submit in accordance with Conditions of the Contract and Division 1 Specification sections.
- B. Submit product data (catalog cuts) including manufacturers' technical product information for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
- C. Submit six (6) copies of schedule organized vertically into "Hardware Sets" with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:
1. Include a Cover Sheet with;
 - a. Job Name, location, telephone number.
 - b. Architects name, location and telephone number.
 - c. Contractors name, location, telephone number and job number.
 - d. Suppliers name, location, telephone number and job number.
 - e. Hardware consultant's name, location and telephone number.
 2. Job Index information included;
 - a. Numerical door number index including; door number, hardware heading number and page number.
 - b. Complete keying information (referred to DHI hand-book "Keying Systems and Nomenclature"). Provision should be made in the schedule to provide keying information when available; if it is not available at the time the preliminary schedule is submitted.
 - c. Manufacturers' names and abbreviations for all materials.
 - d. Explanation of abbreviations, symbols, and codes used in the schedule.
 - e. Mounting locations for hardware.
 - f. Clarification statements or questions.
 - g. Catalog cuts and manufacturer's technical data and instructions.
 3. Vertical schedule format sample:

| Heading Number 1 (Hardware group or set number – HW -1) | | | | | |
|---|-----|--------|--|---------|---------|
| | | | (a) 1 Single Door #1 - Exterior from Corridor 101 | (b) 90° | (c) RH |
| | | | (d) 3' 0"x7' 0" x 1-3/4" x (e) 20 Minute (f) WD x HM | | |
| (g) 1 | (h) | (i) ea | (j) Hinges - (k) 5BB1HW 4.5 x 4.5 NRP (l) ½ TMS | (m) 626 | (n) IVE |
| 2 | 6AA | 1 ea | Lockset - ND50PD x RHO x RH x 10-025 x JTMS | 626 | SCH |

(a) - Single or pair with opening number and location. (b) - Degree of opening (c) - Hand of door(s) (d) - Door and frame dimensions and door thickness. (e) - Label requirements

if any. (f) - Door by frame material. (g) - (Optional) Hardware item line #. (h) - Keyset Symbol. (i) - Quantity. (j) - Product description. (k) - Product Number. (l) - Fastenings and other pertinent information. (m) - Hardware finish codes per ANSI A156.18. (n) - Manufacture abbreviation.

- D. Make substitution requests in accordance with Division 1. Substitution requests must be made prior to bid date. Include product data and indicate benefit to the project. Furnish samples of any proposed substitution.
- E. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
- F. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- G. Furnish as-built/as-installed schedule with close-out documents, including keying schedule and transcript, wiring/riser diagrams, manufacturers' installation and adjustment and maintenance information.
- H. Fire Door Assembly Testing: Submit a written record of each fire door assembly to the Owner to be made available to the Authority Having Jurisdiction (AHJ) for future building inspections.
- I. providing information necessary for required LEED rating.

1.05 QUALITY ASSURANCE

- A. Obtain each type of hardware (latch and lock sets, hinges, closers, exit devices, etc.) from a single manufacturer.
- B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
 - 1. Responsible for detailing, scheduling and ordering of finish hardware.
 - 2. Meet with Owner to finalize keying requirements and to obtain final instructions in writing.
 - 3. Stock parts for products supplied and are capable of repairing and replacing hardware items found defective within warranty periods.
- C. Hardware Installer: Company specializing in the installation of commercial door hardware with five years documented experience.
- D. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given

type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not.

1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".
- E. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Coordinate delivery of packaged hardware items to the appropriate locations (shop or field) for installation.
- B. Hardware items shall be individually packaged in manufacturers' original containers, complete with proper fasteners. Clearly mark packages on outside to indicate contents and locations in hardware schedule and in work.
- C. Provide locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, etc.
- D. Contractor to inventory door hardware jointly with representatives of hardware supplier and hardware installer until each all are satisfied that count is correct.

1.07 WARRANTY

- A. Provide warranties of respective manufacturers' regular terms of sale from day of final acceptance as follows:
1. Locksets: Ten (10) years.
 2. Closers: Thirty (30) years.
 3. Exit devices: Three (3) years.
 4. All other hardware: Two (2) years.

1.08 MAINTENANCE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

1.09 PRE-INSTALLATION CONFERENCE

- A. Convene a pre-installation conference at least one week prior to beginning work of this section.
- B. Attendance: Architect, Construction Manager, Contractor, Security Contractor, Hardware Supplier, Installer, Key District Personnel, and Project Inspector.
- C. Agenda: Review hardware schedule, products, installation procedures and coordination required with related work. Review District's keying standards.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

| <u>Item</u> | <u>Manufacturer</u> | <u>Acceptable Substitutes</u> |
|------------------------------------|---------------------|-------------------------------|
| Hinges | Ives | Hager, Stanley, McKinney |
| Locks, Latches & Cylinders | Schlage | Or Approved Equal |
| Exit Devices | Von Duprin | Or Approved Equal |
| Closers | LCN | Or Approved Equal |
| Push, Pulls & Protection Plates | Ives | Trimco, BBW, DCI |
| Flush Bolts | Ives | Trimco, BBW, DCI |
| Dust Proof Strikes | Ives | Trimco, BBW, DCI |
| Coordinators | Ives | Trimco, BBW, DCI |
| Stops | Ives | Trimco, BBW, DCI |
| Overhead Stops | Glynn-Johnson | Or Approved Equal |
| Thresholds | Zero | Pemko, National Guard |
| Seals & Bottoms | Zero | Pemko, National Guard |

2.02 MATERIALS

- A. Hinges: Exterior out-swinging door butts shall be non-ferrous material and shall have stainless steel hinge pins. All doors to have non-rising pins.
1. Hinges shall be sized in accordance with the following:
 - a. Height:
 - 1) Doors up to 42" wide: 4-1/2" inches.
 - 2) Doors 43" to 48" wide: 5 inches.
 - b. Width: Sufficient to clear frame and trim when door swings 180 degrees.
 - c. Number of Hinges: Furnish 3 hinges per leaf to 7'-5" in height. Add one for each additional 2 feet in height.
 2. Furnish non-removable pins (NRP) at all exterior out-swing doors and interior key lock doors with reverse bevels.
- B. Continuous Hinges: As manufactured by Ives, an Allegion Company. UL rated as required.
- C. Heavy Duty Cylindrical Locks and Latches: Schlage "ND" Series as scheduled with "Rhodes" design, fastened with through-bolts and threaded chassis hubs.

1. Provide cylindrical locksets exceeding the ANSI/BHMA A156.2 Grade 1 performance standards for strength, security, and durability in the categories below:
 - a. Abusive Locked Lever Torque Test – minimum 3,100 inch-pounds without gaining access
 - b. Offset lever pull – minimum 1,600 foot pounds without gaining access
 - c. Vertical lever impact – minimum 100 impacts without gaining access
 2. Cycle life - tested to minimum 16 million cycles per ANSI/BHMA A156.2 Cycle Test with no visible lever sag or use of performance aids such as set screws or spacers
 3. UL 10C for 4'-0" x 10'-0" 3-hour fire door.
 4. Cylinders: Refer to "KEYING" article, herein.
 5. Provide solid steel anti-rotation through bolts and posts to control excessive rotation of lever.
 6. Provide lockset that allows lock function to be changed to over twenty other common functions by swapping easily accessible parts.
 7. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2 inch latch throw capable of UL listing of 3 hours on a 4' x 10' opening. Provide proper latch throw for UL listing at pairs.
 8. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
 9. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
 10. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
 11. Provide wired electrified options as scheduled in the hardware sets.
 - a. 12 through 24 volt DC operating capability, auto-detecting
 - b. Selectable EL (fail safe)/EU (fail secure) operating mode via switch on chassis
 - c. 0.230A (230mA) maximum current draw
 - d. 0.010A (10mA) holding current
 - e. Modular / "plug in" request to exit switch
 12. Lever Trim: Solid cast levers without plastic inserts, and wrought roses on both sides.
- D. Exit devices: Von Duprin as scheduled.
1. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 - 2001 standards.
 2. All internal parts shall be of cold-rolled steel with zinc dichromate coating.
 3. Mechanism case shall have an average thickness of .140".
 4. Compression spring engineering.
 5. Non-handed basic device design with center case interchangeable with all functions.
 6. All devices shall have quiet return fluid dampeners.
 7. All latchbolts shall be deadlocking with 3/4" throw and have a self-lubricating coating to reduce friction and wear.
 8. Device shall bear UL label for fire and or panic as may be required.
 9. All surface strikes shall be roller type and utilize a plate underneath to prevent movement.
 10. All Exit Devices to be sex-bolted to the doors.
 11. Panic Hardware shall comply with CBC Section 11B.404.2.7 and shall be mounted between 34" and 44" above the finished floor surface.
 - a. Provide exit devices UL certified to meet maximum 5 pound requirements according to the California Building Code section 11B-309.4, and UL listed for Panic Exterior Fire Exit Hardware.

E. Closers: LCN as scheduled. Place closers inside building, stairs, room, etc.

1. Door closer cylinders shall be of high strength cast iron construction with double heat treated pinion shaft to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.
2. All door closers shall be fully hydraulic and have full rack and pinion action with a shaft diameter of a minimum of 1 1/16 inch and piston diameter of 1 inch to ensure longevity and durability under all closer applications.
3. All parallel arm closers shall incorporate one piece solid forged steel arms with bronze bushings. 1-9/16" steel stud shoulder bolts, shall be incorporated in regular arms, hold-open arms, arms with hold open and stop built in. All other closers to have forged steel main arms for strength, durability, and aesthetics for versatility of trim accommodation, high strength and long life.
4. All parallel arm closers so detailed shall provide advanced backcheck for doors subject to severe abuse or extreme wind conditions. This advanced backcheck shall be located to begin cushioning the opening swing of the door at approximately 45 degrees. The intensity of the backcheck shall be fully adjustable by tamper resistant non-critical screw valve.
5. Closers shall be installed to permit doors to swing 180 degrees.
6. All closers shall utilize a stable fluid withstanding temperature range of 120 degrees F. to -30 degrees F. without requiring seasonal adjustment of closer speed to properly close the door.
7. Provide the manufactures drop plates, brackets and spacers as required at narrow head rails and special frame conditions. NO wood plates or spacers will be allowed.
8. Maximum effort to operate closers shall not exceed 5 lbs., such pull or push effort being applied at right angles to hinged doors. Compensating devices or automatic door operators may be utilized to meet the above standards. When fire doors are required, the maximum effort to operate the closer may be increased but shall not exceed 15 lbs. when specifically approved by fire marshal. All closers shall be adjusted to operate with the minimum amount of opening force and still close and latch the door. These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position. Per 11B-404.2.8.1, door shall take at least 5 seconds to move from an open position of 90 degrees to a position of 12 degrees from the latch jamb.

F. Flush Bolts & Dust Proof Strikes: Automatic Flush Bolts shall be of the low operating force design. Utilize the top bolt only model for interior doors where applicable and as permitted by testing procedures.

1. Manual flush bolts only permitted on storage or mechanical openings as scheduled.
2. Provide dust proof strikes at openings using bottom bolts.

G. Door Stops:

1. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
2. Do not install floor stops more than four (4) inches from the face of the wall or partition (CBC Section 11B-307).

3. Overhead stops shall be made of stainless steel and non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.
- H. Protection Plates: Fabricate either kick, armor, or mop plates with four beveled edges. Provide kick plates 10" high and 2" LDW. Sizes of armor and mop plates shall be listed in the Hardware Schedule. Furnish with machine or wood screws of bronze or stainless to match other hardware.
- I. Thresholds: As Scheduled and per details.
 1. Thresholds shall not exceed 1/2" in height, with a beveled surface of 1:2 maximum slope.
 2. Set thresholds in a full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Division 7 "Thermal and Moisture Protection".
 3. Use 1/4" fasteners, red-head flat-head sleeve anchors (SS/FHSL).
 4. Thresholds shall comply with CBC Section 11B-404.2.5.
- J. Seals: Provide silicone gasket at all rated and exterior doors.
 1. Fire-rated Doors, Resilient Seals: UL10C Classified complies with NFPA 80 & NFPA 252. Coordinate with selected door manufacturers' and selected frame manufacturers' requirements.
 2. Fire-rated Doors, Intumescent Seals: Furnished by selected door manufacturer. Furnish fire-labeled opening assembly complete and in full compliance with UL10C Classified complies with NFPA 80 & NFPA 252. Where required, intumescent seals vary in requirement by door type and door manufacture -- careful coordination required.
 3. Smoke & Draft Control Doors, Provide UL10C Classified complies with NFPA 80 & NFPA 252 for use on "S" labeled Positive Pressure door assemblies.
- K. Door Shoes & Door Top Caps: Provide door shoes at all exterior wood doors and top caps at all exterior out-swing doors.
- L. Silencers: Furnish silencers for interior hollow metal frames, 3 for single doors, 2 for pairs of doors. Omit where sound or light seals occurs, or for fire-resistive-rated door assemblies.

2.03 KEYING

- A. Furnish a Schlage masterkey system as directed by the owner or architect.
- B. A detailed keying schedule is to be prepared by the owner and/or architect in consultation with a representative of the lock manufacturer. Each keyed cylinder on every keyed lock is to be listed separately showing the door #, key group (in BHMA terminology), cylinder type, finish and location on the door.
- C. Establish a new masterkey system for this project as directed by the keying schedule.
- D. Furnish all cylinders in the Schlage Full Size Interchangeable Core (FSIC). Pack change keys independently (PKI).
- E. Furnish construction core keying for doors during construction.
- F. Furnish mechanical keys as follows:

1. Furnish 2 cut change keys for each different change key code.
2. Furnish 1 uncut key blank for each change key code.
3. Furnish 6 cut masterkeys for each different masterkey set.
4. Furnish 3 uncut key blanks for each masterkey set.
5. Furnish 2 cut control keys cut to the top masterkey for permanent I/C cylinders.
6. Furnish 1 cut control key cut to each SKD combination.

G. Furnish Schlage Padlocks and the cylinders to tie them into the masterkey system for gates, storage boxes, utility valve security, roof hatches and roll-up doors keyed as directed in the keying schedule.

2.04 FINISHES

- A. Generally to be satin chrome US26D (626 on bronze and 652 on steel) unless otherwise noted.
- B. Furnish push plates, pull plates and kick or armor plates in satin stainless steel US32D (630) unless otherwise noted.
- C. Door closers shall be powder-coated to match other hardware, unless otherwise noted.
- D. Aluminum items to be finished anodized aluminum except thresholds which can be furnished as standard mill finish.

2.05 FASTENERS

- A. Screws for strikes, face plates and similar items shall be flat head, countersunk type, provide machine screws for metal and standard wood screws for wood.
- B. Screws for butt hinges shall be flathead, countersunk, full-thread type.
- C. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.
- D. Provide expansion anchors for attaching hardware items to concrete or masonry.
- E. All exposed fasteners shall have a phillips head.
- F. Finish of exposed screws to match surface finish of hardware or other adjacent work.
- G. All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or through bolts.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that doors and frames are square and plumb and ready to receive work and dimensions are as instructed by the manufacturer.
- B. Beginning of installation means acceptance of existing conditions.

- C. Fire-Rated Door Assembly Inspection: Upon completion of the installation, all fire door assemblies shall be inspected to confirm proper operation of the closing device and latching device and that only the manufacturer's furnished fasteners are used for installation and that it meets all criteria of a fire door assembly per NFPA 80 (Standard for Fire Doors and Other Opening Protectives) 2013 Edition. A written record shall be maintained and transmitted to the Owner to be made available to the Authority Having Jurisdiction (AHJ). The inspection of the swinging fire doors shall be performed by a certified FDAI (Fire Door Assembly Inspector) with knowledge and understanding of the operating components of the type of door being subjected to the inspection. The record shall list each fire door assembly throughout the project and include each door number, an itemized list of hardware set components at each door opening, and each door location in the facility.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and requirements of DHI.
- B. Use the templates provided by hardware item manufacturer.
- C. Mounting heights for hardware shall be as recommended by the Door and Hardware Institute. Operating hardware will be located between 34" and 44" AFF.
- D. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- F. Set thresholds for exterior doors in full bed of butyl-rubber sealant.
- G. If hand of door is changed during construction, make necessary changes in hardware at no additional cost.

3.03 ADJUST AND CLEAN

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Clean adjacent surface soiled by hardware installation.
- C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy, return to that work area and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- D. Instruct Owner's Personnel in proper adjustment and maintenance of hardware finishes, during the final adjustment of hardware.
- E. Continued Maintenance Service: Approximately six months after the completion of the project, the Contractor accompanied by the Architectural Hardware Consultant, shall return to

the project and re-adjust every item of hardware to restore proper functions of doors and hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.04 HARDWARE LOCATIONS

- A. Conform to CCR, Title 24, Part 2; and ADAAG; and the drawings for access-compliant positioning requirements for the disabled.

3.05 FIELD QUALITY CONTROL

- A. Contractor is responsible for providing the services of an Architectural Hardware Consultant (AHC) or a proprietary product technician to inspect installation and certify that hardware and its installation have been furnished and installed in accordance with manufacturers' instructions and as specified herein.

3.06 SCHEDULE

- A. The items listed in the following schedule shall conform to the requirements of the foregoing specifications.
- B. While the hardware schedule is intended to cover all doors, and other movable parts of the building, and establish type and standard of quality, the contractor is responsible for examining the Plans and Specifications and furnishing proper hardware for all openings whether listed or not. If there are any omissions in hardware groups in regard to regular doors they shall be called to the attention of the Architect prior to bid opening for instruction; otherwise, list will be considered Complete. No extras will be allowed for omissions.
- C. The Door Schedule on the Drawings indicates which hardware set is used with each door.

Manufacturers Abbreviations (Mfr.)

| | | | | |
|-----|---|----------------------|---|-------------------------------------|
| IVE | = | Ives | Hinges | Kick Plates, Door Stops & Silencers |
| LCN | = | LCN | Door Closers | |
| SCH | = | Schlage Lock Company | Locks, Latches & Cylinders | |
| ZER | = | Zero International | Thresholds, Gasketing & Weather-stripping | |

SPEXTRA: 325239

HARDWARE GROUP – STUDENT MULTI RESTROOM INTERIOR - DOOR #'S A1.1 & A1.2

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|-----|----------------|-----------------------|--------|-----|
| 1 | EA | CONT. HINGE | 112HD | 628 | IVE |
| 1 | EA | PUSH PLATE | 8200 4" X 16" | 630 | IVE |
| 1 | EA | PULL PLATE | 8302 8" 4" X 16" | 630 | IVE |
| 1 | EA | SURFACE CLOSER | 4040XP EDA | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 10" X 2" LDW B4E | 630 | IVE |
| 1 | SET | SEALS | S88D | DKB | PEM |
| 1 | EA | DOOR SHOE | 222AV | AL | PEM |
| 1 | EA | THRESHOLD | 2748A | AL | PEM |
| 1 | EA | DOOR STOP | FS436 | 626 | IVE |

END OF SECTION

SECTION 09 29 00 - GYPSUM BOARD**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.
 - 2. Tile backing panels.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

1.4 QUALITY ASSURANCE

- A. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Install mockups for the following:
 - a. Each level of gypsum board finish indicated for use in exposed locations.
 - b. Each texture finish indicated.
 - 2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
 - 3. Simulate finished lighting conditions for review of mockups.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or blotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. Low-Emitting Materials: For ceiling and wall assemblies, provide materials and construction identical to those tested in assembly and complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. American Gypsum.
 - 2. CertainTeed Corp.
 - 3. Georgia-Pacific Gypsum LLC.
 - 4. Lafarge North America Inc.
 - 5. National Gypsum Company.

6. PABCO Gypsum.
7. Temple-Inland.
8. USG Corporation.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

C. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch (15.9 mm), Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

D. Gypsum Ceiling Board: ASTM C 1396/C 1396M.

1. Thickness: 1/2 inch.
2. Long Edges: Tapered.

2.4 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges.

1. Thickness: 5/8".
2. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - f. Expansion (control) joint.
 - g. Curved-Edge Cornerbead: With notched or flexible flanges.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
2. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
 - 2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
- D. Joint Compound for Tile Backing Panels:
 - 1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.7 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
 - 1. Laminating adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- E. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
 - b. Grabber Construction Products; Acoustical Sealant GSC.
 - c. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
 - d. USG Corporation; SHEETROCK Acoustical Sealant.
 2. Acoustical joint sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- F. Thermal Insulation: As specified in Section 07 21 00 "Thermal Insulation."
- G. Vapor Retarder: As specified in Section 07 21 00 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 2. Fit gypsum panels around ducts, pipes, and conduits.
 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
1. Type X: Vertical surfaces unless otherwise indicated.
 2. Ceiling Type: Ceiling surfaces.
 3. Moisture- and Mold-Resistant Type: Restrooms (above tile).
 4. Cementitious Backer Units: Restrooms (behind tile).
- B. Single-Layer Application:
1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
 2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
 4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
- D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.
- E. Curved Surfaces:
1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- long straight sections at ends of curves and tangent to them.
 2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.
 3. Board Thickness: 1/2 inch.

3.4 APPLYING TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
 2. L-Bead: Use where indicated.
 3. U-Bead: Use at exposed panel edges.
 4. Curved-Edge Cornerbead: Use at curved openings.
- D. Aluminum Trim: Install in locations indicated on Drawings.

3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 2. Level 2: Panels that are substrate for acoustical tile.
 3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."
 4. Level 5: Where indicated on Drawings.
 - a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.
- C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

3.8 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for ceilings.
- B. Related Requirements:
 - 1. Section 09 51 23 "Acoustical Tile Ceilings" for ceilings consisting of mineral-base acoustical tiles used with concealed suspension systems, stapling, or adhesive bonding.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Test Reports: For each acoustical panel ceiling, for tests performed by a qualified testing agency.
- C. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Panels: Full-size panels equal to 2 percent of quantity installed.
 - 2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and modifications by California Building Code 2013. Shall comply with DSA IR 25-2.13 Metal Suspension Systems for Lay In Panel Ceilings 2013 CBC.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
 - 2. Smoke-Developed Index: 50 or less.

2.2 ACOUSTICAL PANELS, GENERAL

- A. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
 - 2. Suspension System: Obtain each type from single source from single manufacturer.
- B. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.

- C. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
 - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E 795.
- D. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
 - 1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.3 ACOUSTICAL PANELS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong Ultima High NRC or comparable product by one of the following:
 - 1. CertainTeed Corp.
 - 2. USG Interiors, Inc.; Subsidiary of USG Corporation.
 - 3. Or equal.
- B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - 1. Type and Form: Type IV, mineral fiber base with DuraBrite; Form 2, water felted.
 - 2. Pattern: E
- C. Color: White.
- D. LR: Not less than 0.87.
- E. NRC: Not less than 0.80.
- F. CAC: Not less than 35.
- G. Edge/Joint Detail: Reveal sized to fit flange of exposed suspension-system members.
- H. Thickness: 15/16 inch.
- I. Modular Size: 24 by 48 inches and 24 by 24 inches.
- J. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or

bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.
- B. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

2.5 METAL SUSPENSION SYSTEM

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong Prelude XL or comparable product by one of the following:
 - 1. CertainTeed Corp.
 - 2. Chicago Metallic Corporation.
 - 3. USG Interiors, Inc.; Subsidiary of USG Corporation.
 - 4. Or equal.
- B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than **G30** coating designation; with prefinished **15/16-inch-** wide metal caps on flanges.
 - 1. Structural Classification: Heavy-duty system.
 - 2. End Condition of Cross Runners: butt-edge type.
 - 3. Face Design: Flat, flush.
 - 4. Cap Material: Steel cold-rolled sheet.
 - 5. Cap Finish: Painted white.

2.6 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.7 ACOUSTICAL SEALANT

A. Products: Subject to compliance with requirements, provide one of the following:

1. Acoustical Sealant for Exposed and Concealed Joints:

- a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
- b. USG Corporation; SHEETROCK Acoustical Sealant.
- c. Or equal.

2. Acoustical Sealant for Concealed Joints:

- a. Henkel Corporation; OSI Pro-Series SC-175 Acoustical Sound Sealant.
- b. Pecora Corporation; AIS-919.
- c. Tremco, Inc.; Tremco Acoustical Sealant.
- d. Or equal.

B. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant.
2. Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant.
3. Acoustical sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements

for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as detailed on Drawings.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
 - 1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 - 2. Screw attach moldings to substrate at intervals not more than **16 inches** o.c. and not more than **3 inches** from ends, leveling with ceiling suspension system to a tolerance of **1/8 inch in 12 feet**. Miter corners accurately and connect securely.
 - 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
 - 1. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
 - 2. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and

touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
 - 2. Resilient molding accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than **10 linear feet** for every **500 linear feet** or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than **50 deg F** or more than **90 deg F**.

1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than **70 deg F** or more than **95 deg F**, in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.

- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 VINYL BASE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Burke Mercer Flooring Products, Division of Burke Industries Inc.
 - 2. Or equal.
- B. Product Standard: ASTM F 1861, Type TV (vinyl, thermoplastic).
 - 1. Group: I (solid, homogeneous).
 - 2. Style and Location:
 - a. Style A, Straight: Provide in areas with carpet.
 - b. Style B, Cove: Provide in areas with resilient flooring.
- C. Minimum Thickness: 0.125 inch.
- D. Height: 6 inches.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Job formed.
- G. Inside Corners: Job formed.
- H. Colors and Patterns: Noble Fir.

2.3 VINYL MOLDING ACCESSORY

- A. Description: Vinyl carpet edge for glue-down applications, reducer strip for resilient flooring, and joiner for tile and carpet transition strips.

- B. Profile and Dimensions: As indicated.
- C. Locations: Provide vinyl molding accessories in areas indicated.
- D. Colors and Patterns: As selected by Architect from full range of industry colors.

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
 - 1. Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are the same temperature as the space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Form without producing discoloration (whitening) at bends.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Miter or cope corners to minimize open joints.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 09 65 13

SECTION 096723
RESINOUS FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Resinous flooring systems.

- B. Related Sections:

- 1. Section 079200 "Joint Sealants" for sealants installed at joints in resinous flooring systems.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.
- B. Samples for Initial Selection: For each type of exposed finish required.
- C. Samples for Verification: For each resinous flooring system required, 6 inches (150 mm) square, applied to a rigid backing by Installer for this Project.

1.4 INFORMATIONAL SUBMITTALS

- A. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- B. Material Certificates: For each resinous flooring component, from manufacturer.
- C. Material Test Reports: For each resinous flooring system.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For resinous flooring to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of flooring systems required for this Project.
 - 1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
- B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.
- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.
- C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide:
 - 1. Tera Lite, Tera Gem III
 - 2. Or approved equal.

2.2 RESINOUS FLOORING

- A. Resinous Flooring: Abrasion-, impact- and chemical-resistant, decorative-aggregate-filled, epoxy-resin-based, monolithic floor surfacing designed to produce a seamless floor and integral cove base.
- B. System Characteristics:

1. Color and Pattern: Match Architect's sample.
 2. Wearing Surface: Textured for slip resistance.
 3. Overall System Thickness: 1/4 inch (6.4 mm).
- C. Body Coats:
1. Resin: Epoxy.
 2. Application Method: Troweled or screeded.
 - a. Thickness of Coats: 1/4 inch (6.4 mm).
 - b. Number of Coats: One.
 3. Aggregates: Colored quartz (ceramic-coated silica).
- D. Topcoat: Sealing or finish coats.
1. Resin: Epoxy.
 2. Type: Pigmented.
 3. Finish: Gloss.
 4. Number of Coats: Two.
- E. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:
1. Compressive Strength: 11,500psi per ASTM C 579.
 2. Tensile Strength: 2500psi per ASTM C 307.
 3. Flexural Modulus of Elasticity: 4500psi per ASTM C 580.
 4. Water Absorption: 0.25% per ASTM C 413.
 5. Impact Resistance: No chipping, cracking, or delamination and not more than 1/16-inch (1.6-mm) permanent indentation per MIL-D-3134.
 6. Resistance to Elevated Temperature: No slip or flow of more than 1/16 inch (1.6 mm) per MIL-D-3134.
 7. Abrasion Resistance: 0.034gm maximum weight loss per ASTM D 4060.
 8. Flammability: Self-extinguishing per ASTM D 635.
 9. Critical Radiant Flux: 0.45 W/sq. cm or greater per NFPA 253.
 10. Hardness: 83, Shore D per ASTM D 2240.
 11. Bond Strength: >400 per ASTM 4541.
- F. System Chemical Resistance: Test specimens of cured resinous flooring system are unaffected when tested according to ASTM D 1308 for 50 percent immersion in the following reagents for no fewer than seven days:
1. 30% Nitric Acid ASTM-D-1308 No Effect
 2. 30% Phosphoric Acid ASTM-D-1308 No Effect
 3. 20% Hydrochloric Acid ASTM-D-1308 No Effect
 4. 70% Sulfuric Acid ASTM-D-1308 No Effect
 5. 10% Acetic Acid ASTM-D-1308 No Effect
 6. 50% Sodium Hydroxide ASTM-D-1308 No Effect
 7. Urine ASTM-D-1308 No Effect
 8. Household Cleaner ASTM-D-1308 No Effect
 9. Beer/Wine ASTM-D-1308 No Effect

10. Rubbing Alcohol ASTM-D-1308 No Effect
11. Bleach ASTM-D-1308 No Effect

2.3 ACCESSORIES

- A. Primer: Type recommended by manufacturer for substrate and body coats indicated.
- B. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.

PART 3 - EXECUTION

3.1 PREPARATION

- A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry substrate for resinous flooring application.
- B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
 1. Roughen concrete substrates as follows:
 - a. Comply with ASTM C 811 requirements unless manufacturer's written instructions are more stringent.
 2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written instructions.
 3. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application of resinous flooring only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) of slab area in 24 hours.
 - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 4. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.
- C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
- D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

- E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written instructions.

3.2 APPLICATION

- A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
 - 1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
 - 2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
 - 3. At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and topcoating of cove base. Round internal and external corners.
 - 1. Integral Cove Base: 6 inches high.
- D. Apply troweled or screeded body coats in thickness indicated for flooring system. Hand or power trowel and grout to fill voids. When cured, remove trowel marks and roughness using method recommended by manufacturer.
- E. Apply topcoats in number indicated for flooring system and at spreading rates recommended in writing by manufacturer.

3.3 PROTECTION

- A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

END OF SECTION 096723

SECTION 09 68 00 – CARPET**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Tufted carpet.
- B. Related Requirements:
 - 1. Division 1 Section "Selective Demolition" for removing existing floor coverings.
 - 2. Division 9 Section "Resilient Wall Base and Accessories]" for resilient wall base and accessories installed with carpet.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following, including installation recommendations for each type of substrate:
 - 1. Carpet: For each type indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Carpet Cushion: For each type indicated. Include manufacturer's written data on physical characteristics and durability.
- B. Shop Drawings: Show the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet.
 - 2. Seam locations, types, and methods.
 - 3. Pattern type, repeat size, location, direction, and starting point.
 - 4. Pile direction.
 - 5. Type, color, and location of edge, transition, and other accessory strips.
 - 6. Transition details to other flooring materials.
- C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet: 12-inch- (300-mm-) square Sample.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Test Reports: For carpet, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced Installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.
- B. Fire-Test-Response Ratings: Where indicated, provide carpet identical to those of assemblies tested for fire response per NFPA 253 by a qualified testing agency.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104.

1.8 FIELD CONDITIONS

- A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.
- C. Do not install carpet over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet before installing these items.

1.9 WARRANTY

- A. Special Warranty for Carpet: Manufacturer agrees to provide labor and materials to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, and delamination.
3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TUFTED CARPET

- A. Basis of Design: Subject to compliance with requirements, provide the following:

1. Mohawk Group Motorsport II Photo finish II
2. Or Equal

- B. Color: Architect to select from Manufacturer's full range.

- C. Type: Broadloom

- D. Fiber Type: Duracolor® Premium Nylon, Stain resistant

- E. Pile Thickness: .127" for finished carpet.

- F. Stitches: 11.9 per inch

- G. Gauge: 1/12.

- H. Face Weight: 24 oz./sq. yd. (g/sq. m)>.

- I. Backing: Unibond Plus

- J. Backcoating: Unibond Flex Bloc.

- K. Applied Soil-Resistance Treatment: SSP Shaw Soil Protection.

- L. Antimicrobial Treatment: Manufacturer's standard material.

- M. Performance Characteristics: As follows:

1. Appearance Retention Rating: Heavy traffic, 3.0 minimum per ASTM D 7330.
2. Dry Breaking Strength: Not less than 100 lbf (445 N) per ASTM D 2646.
3. Tuft Bind: Not less than 6.2 lbf (28 N) per ASTM D 1335.
4. Delamination: Not less than 4 lbf/in. (18 N/mm) per ASTM D 3936.
5. Colorfastness to Crocking: Not less than 4, wet and dry, per AATCC 165.
6. Colorfastness to Light: Not less than 4 after 60 AFU (AATCC fading units) per AATCC 16, Option E.
7. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria; not less than 1-mm halo of inhibition for gram-negative bacteria; no fungal growth; per AATCC 174.

8. Electrostatic Propensity: Less than 3.5kV per AATCC 134.
9. Emissions: Provide carpet that complies with the product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet manufacturer.
 1. Use adhesives that comply with the product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 2. Provide NuBroadlok Premium Plus or approved equal.
- C. Seam Adhesive: As recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.
 1. Provide NuBroadlok Moisture Proof Latex Seam Sealer or approved equal.
- D. Primer/Sealer for subfloor treatment: As recommended by carpet manufacturer for sealing floors.
 2. Provide OptiSeal™ Adhesive, Cutback and Moisture or approved equal

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Examine carpet for type, color, pattern, and potential defects.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet manufacturer.
 2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving carpet.
 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI 104, Section 7.3, "Site Conditions; Floor Preparation," and with carpet manufacturer's written installation instructions for preparing substrates.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm), unless more stringent requirements are required by manufacturer's written instructions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet manufacturer.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet.

3.3 INSTALLATION

- A. Comply with CRI 104 and carpet manufacturer's written installation instructions for the following:
 - 1. Direct-Glue-Down Installation: Comply with CRI 104, Section 9, "Direct Glue-Down Installation."
- B. Comply with carpet manufacturer's written recommendations and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
- C. Do not bridge building expansion joints with carpet.
- D. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- E. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders to comply with CRI 104, Section 15, "Patterned Carpet Installations" and with carpet manufacturer's written recommendations.

3.4 CLEANING AND PROTECTING

- A. Perform the following operations immediately after installing carpet:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
 2. Remove yarns that protrude from carpet surface.
 3. Vacuum carpet using commercial machine with face-beater element.
- B. Protect installed carpet to comply with CRI 104, Section 16, "Protecting Indoor Installations."
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer and carpet adhesive manufacturer.

END OF SECTION 09 68 00

SECTION 09 91 23 – INTERIOR PAINTING**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior substrates.
 - 1. Concrete.
 - 2. Steel.
 - 3. Cast iron.
 - 4. Galvanized metal.
 - 5. Aluminum (not anodized or otherwise coated).
 - 6. Wood.
 - 7. Gypsum board.
 - 8. Plaster.
- B. Related Requirements:
 - 1. Division 8 Sections for factory priming and painting of windows and doors.
 - 2. Division 9 painting Sections for high-performance coatings.
 - 3. Division 9 Section "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

- G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
1. Submit Samples on rigid backing, 8 inches (200 mm) square.
 2. Step coats on Samples to show each coat required for system.
 3. Label each coat of each Sample.
 4. Label each Sample for location and application area.
- C. Product List: For each product indicated, include the following:
1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
 3. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Paint: 1 gal. (3.8 L) of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide product listed in other Part 2 articles for the paint category indicated or provide comparable products by one of the following:
 1. Dunn Edwards
 2. ICI Paints.
 3. Kelly-Moore Paints.

2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. Colors: Match Architect's samples.

2.3 PRIMERS/SEALERS

- A. Primer Sealer, Latex, Interior:
 - 1. Dunn Edwards Vinylastic Premium PVA Primer VNPR00.
- B. Primer, Alkali Resistant, Water Based:
 - 1. Dunn Edwards Acri-Loc W6232.
- C. Primer, Latex, for Interior Wood:
 - 1. Dunn Edwards Intercoat IKPR00
- D. Primer, Acrylic, over existing Vinyl Wallcovering:
 - 1. Zinsser BONDZ.

2.4 METAL PRIMERS

- A. Primer, Alkyd, Anti-Corrosive, for Metal:
 - 1. Dunn Edwards Bloc-Rust Premium BRPR00.
- B. Primer, Galvanized, Water Based:
 - 1. Dunn Edwards Ultra-Grip UGPR00.

2.5 WATER-BASED PAINTS

- A. Latex, Interior, (Gloss Level 4):
 - 1. Dunn Edwards Spartashell W7400.
- B. Latex, Interior, Semi-Gloss, (Gloss Level 5):
 - 1. Dunn Edwards Spartaglo W7500.
- C. Epoxy Acrylic, Interior, Gloss, (Gloss Level 6):
 - 1. Carboline Sanitile 255 CBL-ST255L101.

2.6 FLOOR COATINGS

- A. Sealer, Water Based, for Concrete Floors:
 - 1. PPG Industries, Plex-Seal 4-6200.

2.7 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Concrete: 12 percent.
 2. Wood: 15 percent.
 3. Gypsum Board: 12 percent.
 4. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 - 1. SSPC-SP 3, "Power Tool Cleaning."
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- G. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- H. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- D. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 1. Paint the following work where exposed in equipment rooms:
 - a. Pipe hangers and supports.
 - b. Metal conduit.
 2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Architect.
 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Concrete and Plaster Substrates, Non-traffic Surfaces:

1. Latex System:

- a. Prime Coat: Primer, alkali resistant, water based.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, (Gloss Level 4).

B. Concrete Substrates, Traffic Surfaces:

1. Water-Based Clear Sealer System:

- a. First Coat: Sealer, water based, for concrete floors.
- b. Topcoat: Sealer, water based, for concrete floors.

C. Steel Substrates:

1. Latex over Alkyd Primer System:

- a. Prime Coat: Primer, alkyd, anti-corrosive, for metal.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, (Gloss Level 4).

D. Galvanized-Metal Substrates:

1. Latex over Waterborne Primer System:

- a. Prime Coat: Primer, galvanized, water based.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, (Gloss Level 4).

E. Wood Substrates: Including wood trim, architectural woodwork and interior doors.

1. Latex System:

- a. Prime Coat: Primer, latex, for interior wood.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, (Gloss Level 4).

F. Fiberglass and Plastic Substrates:

1. Latex System:

- a. Prime Coat: Primer, bonding, water based.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, (Gloss Level 4).

G. Gypsum Board Substrates:

1. Latex System:

- a. Prime Coat: Primer sealer, latex, interior.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, (Gloss Level 4).
- d. Topcoat (at Shower Areas): Epoxy Acrylic, Interior, Gloss, (Gloss Level 6).

H. Cotton or Canvas and ASJ Insulation-Covering Substrates: Including pipe and duct coverings.

1. Latex System:

- a. Prime Coat: Primer sealer, latex, interior.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, (gloss level 4)

END OF SECTION 09 91 23

SECTION 10 14 23 - SIGNAGE**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Panel signs.
 - 2. Room and Building identification signs,
 - 3. Exit signage
 - 4. General signage.

1.3 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For panel signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
 - 1. Include representative Samples of available typestyles and graphic symbols.
- D. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the California Building Code Chapter 11B-703 for signs.

2.2 SIGNS

- A. Panel Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
- B. Room and Building Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 - 1. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated to acrylic backing sheet to produce composite sheet.
 - a. Composite-Sheet Thickness: 0.25 inch.
 - b. Color(s): Match existing signs - Black Forest Green by Rowmark .
 - 2. Sign-Panel Perimeter: Finish edges smooth.
 - a. Edge Condition: Square cut.
 - b. Corner Condition in Elevation: Square.
 - 3. Mounting: Surface mounted to wall with countersunk flathead through fasteners.
 - 4. Text and Typeface: Accessible raised characters and Braille. Finish raised characters to contrast with background color, and finish Braille to match background color.

2.3 PANEL-SIGN MATERIALS

- A. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).
- B. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
 - 1. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
 - b. Fastener Heads: For nonstructural connections, use flathead screws and bolts with tamper-resistant slots unless otherwise indicated.
 - 2. Sign Mounting Fasteners:
 - a. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, installed in predrilled holes.

2.5 FABRICATION

- A. Surface-Engraved Graphics: Machine engrave characters and other graphic devices into panel surface indicated to produce precisely formed copy, incised to uniform depth.
 - 1. Engraved Opaque Acrylic Sheet: Fill engraved graphics with manufacturer's standard enamel.

2.6 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Room-Identification Signs and Other Accessible Signage: Install in locations on walls as indicated.
- C. Mounting Methods:
 - 1. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
- D. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 23

SECTION 10 21 13 - STAINLESS-STEEL TOILET COMPARTMENTS**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section includes stainless-steel toilet compartments configured as toilet enclosures and urinal screens.
- B. Related Requirements
 - 1. Section 061000 "Rough Carpentry blocking overhead support of floor-and-ceiling-anchored compartments and overhead support of post-to-ceiling screens.
 - 2. Section 102800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories mounted on toilet compartments.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.
- B. Shop Drawings: For toilet compartments.
 - 1. Include plans, elevations, sections, details, and attachment details.
 - 2. Show locations of cutouts for compartment-mounted toilet accessories.
 - 3. Show locations of reinforcements for compartment-mounted grab bars and locations of blocking for surface-mounted toilet accessories.
 - 4. Show locations of centerlines of toilet fixtures.
 - 5. Show locations of floor drains.
 - 6. Show overhead support or bracing locations.
- C. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:
 - 1. Each type of material, color, and finish required for toilet compartments, prepared on 6-inch- (152-mm-) square Samples of same thickness and material indicated for Work.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of toilet compartment.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and CBC 2016 Building Code for toilet compartments designated as accessible.

2.2 STAINLESS-STEEL TOILET COMPARTMENTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide:
 - 1. Bradley, Mills Partitions, Floor to Ceiling, Stainless Steel – Series 700.
 - 2. Or approved equal.
- B. Toilet-Enclosure Style: Floor and ceiling anchored.
- C. Urinal-Screen Style: Post to ceiling.
- D. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding or clips and exposed welds ground smooth. Provide with no-sightline system. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.
 - 1. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch (25 mm) for doors and panels and 1-1/4 inches (32 mm) for pilasters.
 - 2. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units of size and material adequate for panel to withstand applied downward load on grab bar of at least 250 lbf (1112 N), when tested according to ASTM F 446, without deformation of panel.

STAINLESS STEEL TOILET COMPARTMENTS

3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.

E. Urinal-Screen Construction:

1. Flat-Panel Urinal Screen: Matching panel construction.
2. Integral-Flange, Wall-Hung Urinal Screen: Similar to panel construction, with integral full-height flanges for wall attachment, and maximum 1-1/4 inches (32 mm) thick.
3. Wedge-Shaped, Wall-Hung Urinal Screen: Similar to panels, V-shaped, fabricated for concealed wall attachment, and maximum 6 inches (152 mm) wide at wall and minimum 1 inch (25 mm) wide at protruding end.

F. Facing Sheets and Closures: Stainless-steel sheet of nominal thicknesses as follows:

1. Pilasters, Braced at Both Ends: Manufacturer's standard thickness, but not less than 0.038 inch (0.95 mm).
2. Pilasters, Unbraced at One End: Manufacturer's standard thickness, but not less than 0.050 inch (1.27 mm).
3. Panels: Manufacturer's standard thickness, but not less than 0.031 inch (0.79 mm)
4. Doors: Manufacturer's standard thickness, but not less than 0.031 inch (0.79 mm).
5. Flat-Panel Urinal Screens: Thickness matching the panels.
6. Integral-Flange, Wall-Hung Urinal Screens: Manufacturer's standard thickness, but not less than 0.031 inch (0.79 mm).
7. Wedge-Shaped, Wall-Hung Urinal Screens: Manufacturer's standard thickness, but not less than 0.038 inch (0.95 mm).

G. Pilaster Shoes and Sleeves : Stainless-steel sheet, not less than 0.031-inch (0.79-mm) nominal thickness and 3 inches (76 mm) high, finished to match hardware.

H. Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters with shoe and sleeve cap matching that on the pilaster.

I. Brackets (Fittings):

1. Full-Height (Continuous) Type: Stainless steel.

J. Stainless-Steel Finish: Manufacturer's standard textured finish on exposed faces. Protect exposed surfaces from damage by application of strippable, temporary protective covering before shipment.

2.3 HARDWARE AND ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard operating hardware and accessories.

STAINLESS STEEL TOILET COMPARTMENTS

1. Material: Stainless steel.
 2. Hinges: Manufacturer's standard continuous, spring-loaded type, allowing emergency access by lifting door.
 3. Latch and Keeper: Manufacturer's standard recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
 6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel anchors compatible with related materials.

2.4 MATERIALS

- A. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- B. Stainless-Steel Castings: ASTM A 743/A 743M.

2.5 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories and solid blocking within panel where required for attachment of toilet accessories.
- B. Floor-and-Ceiling-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.
- C. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of posts. Provide shoes and sleeves (caps) at posts to conceal anchorage.
- D. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
 - 1. Confirm location and adequacy of blocking and supports required for installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch (13 mm).
 - b. Panels and Walls: 1 inch (25 mm).
 - 2. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
 - a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Floor-and-Ceiling-Anchored Units: Secure pilasters to supporting construction and level, plumb, and tighten. Hang doors and adjust so doors are level and aligned with panels when doors are in closed position.
- C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 10 21 13

SECTION 102800

TOILET ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Warm-air dryers.
 - 2. Public-use washroom accessories
 - 3. Under lavatory guards

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.7 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Bobrick Washroom Equipment, Inc.
 - 2. Or approved equal.
- B. Toilet Tissue (Roll) Dispenser:
 - 1. Product: Bobrick B-3888
 - 2. Description: Double-roll dispenser.
 - 3. Mounting: Surface mount
 - 4. Material and Finish: Stainless steel, No. 4 finish (satin).
- C. Grab Bar:
 - 1. Product: Bobrick B-6806.
 - 2. Mounting: Flanges with concealed fasteners.
 - 3. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
 - a. Finish: Smooth, No. 4 finish (satin).
 - 4. Outside Diameter: [1-1/4 inches (32 mm)] [1-1/2 inches (38 mm)].
 - 5. Configuration and Length: As indicated on Drawings.
- D. Mirror Unit:
 - 1. Product: Bobrick B-165 2436
 - 2. Frame: Stainless-steel channel.

- a. Corners: Mitered and mechanically interlocked.
- 3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
- 4. Size: 18 inches by 30 inches.
- E. Liquid-Soap Dispenser:
 - 1. Product: Bobrick B2111
 - 2. Mounting: Vertically oriented, surface mounted.
 - 3. Material and Finish: Stainless steel, No. 4 finish (satin).
- F. Combination Towel (Folded) Dispenser/Waste Receptacle
 - 1. Product: Bobrick B-3944
 - 2. Description: Combination unit for dispensing C-fold or multifold towels, with removable waste receptacle
 - 3. Mounting: Recessed with projecting (not to exceed 4") receptacle.
 - 4. Material and Finish: Stainless steel, No. 4 finish (satin).
- G. Sanitary-Napkin Disposal Unit
 - 1. Product: Bobrick B270
 - 2. Mounting: Surface mounted.
 - 3. Material and Finish: Stainless steel, No. 4 finish (satin).
- H. Electric Hand Dryer:
 - 1. Basis-of-Design Product: Dyson Airblade V Electric Hand Dryer Model AB12
 - 2. Installation: Wall Surface Mounted
 - 3. Power Source: 110/120V 12 Amp.

2.2 CUSTODIAL ACCESSORIES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the following:
 - 1. Bobrick Washroom Equipment, Inc.
- B. Mop and Broom Holder:
 - 1. Basis-of-Design Product: Bobrick B-239.
 - 2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
 - 3. Length: 36 inches (914 mm).
 - 4. Hooks: Four.
 - 5. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
 - 6. Material and Finish: Stainless steel, No. 4 finish (satin).
 - a. Shelf: Not less than nominal 0.05-inch- (1.3-mm-) thick stainless steel.

- b. Rod: Approximately 1/4-inch- (6-mm-) diameter stainless steel.

2.3 ER LAVATORY GUARDS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Plumberex Specialty Products, Inc.
 - 2. Truebro by IPS Corporation.
- B. Underlavatory Guard:
 - 1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
 - 2. Material and Finish: Antimicrobial, molded plastic, white.

2.4 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated. Provide solid blocking behind both Contractor-furnished and Owner-furnished accessories.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

SECTION 10 44 13 - FIRE PROTECTION CABINETS**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire-protection cabinets for the following:
 - a. Portable fire extinguishers.
- B. Related Requirements:
 - 1. Section 10 44 16 "Fire Extinguishers."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.
- B. Shop Drawings: For fire-protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.5 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS**2.1 FIRE-PROTECTION CABINET**

- A. Cabinet Type: Suitable for fire extinguisher.

- B. Cabinet Construction: Nonrated.
- C. Cabinet Material: Cold-rolled steel sheet.
- D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
 - 1. Rolled-Edge Trim: 4-inch backbend depth.
- E. Cabinet Trim Material: Steel sheet.
- F. Door Material: Steel sheet.
- G. Door Style: Vertical duo panel with frame.
- H. Door Glazing: Tempered float glass (clear).
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - 1. Provide projecting lever handle with cam-action latch.
 - 2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
- J. Accessories:
 - 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 - 2. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
 - 3. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
 - 4. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
- K. Materials:
 - 1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
 - a. Finish: Baked enamel or powder coat.
 - b. Color: As selected by Architect from full range of industry colors and color densities.
 - 2. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.2 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
 - 1. Weld joints and grind smooth.
 - 2. Provide factory-drilled mounting holes.
 - 3. Prepare doors and frames to receive locks.

- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.
 - 1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
 - 2. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.3 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire-protection cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

- A. General: Install fire-protection cabinets in locations and at mounting heights indicated
- B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
 - 1. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

- B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.
- E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 44 13

SECTION 10 44 16 - FIRE EXTINGUISHERS**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.
- B. Related Requirements:
 - 1. Section 10 44 13 "Fire Protection Cabinets."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.6 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to provide labor and materials to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
 1. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
- B. Regular Dry-Chemical Type in Steel Container: UL-rated 10-B:C, 5-lb nominal capacity, with sodium bicarbonate-based dry chemical in enameled-steel container.

2.3 MOUNTING BRACKETS <Insert drawing designation>

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: 48 inches max. above finished floor to top of fire extinguisher. Mount so that bottom of the fire extinguisher is greater than 27 inches, for cane detect ability, if assembly projects further than 4 inches from the wall.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 10 44 16

SECTION 15400 - PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 ANCILLARY GENERAL CONDITIONS

- A. The following shall be ancillary to the General and Supplementary Conditions and Division 1 Specification Sections:
 - 1. Prior to bidding the project, thoroughly examine all construction documents and specifications, survey the existing site conditions, and include all necessary allowances in bid proposal.
 - 2. In case of a discrepancy in the specifications, between the specifications and the drawings, within the drawings, or between work under this section and other sections, the Contractor shall figure the most stringent and most expensive alternate and, after award of contract, secure direction from the Owner's Representative.

1.3 DESCRIPTION OF WORK

- A. The Contractor shall furnish all labor, materials, testing, tools, equipment, services, and transportation necessary for the completion of all plumbing work as indicated on the drawings and specifications herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner. Work includes, but not limited to the following:
 - 1. Plumbing Fixtures.
 - 2. Soil, waste, and vent piping system including connections to equipment furnished in another section of work, stub-outs and connections to exterior stub-outs.
 - 3. Domestic hot and cold water piping systems including water heaters, mixing valves, circulating pumps, pipe insulation connections to equipment furnished in another section of work and connections to exterior stub-outs.
 - 4. Hangers, anchors, sleeves, metal supports, and channels as required for work under this section including sound isolators where indicated.
 - 5. Piping and valve identification.
 - 6. Furnishing and installation of plumbing fixtures and trim.
 - 7. Final piping connections to all fixtures, equipment, including equipment furnished under other sections.
 - 8. Miscellaneous steel work including floor sleeves, slots, inserts, plates, supports, hangers, etc.
 - 9. Demolition work required for this section of work.
 - 10. Testing, adjusting of completed work, inspections, and instructions.
 - 11. Repair of damage done to premises as a result of this installation and removal of all debris left by those engaged in this installation.

12. Shop drawing, submittals, as-built drawings and operation and maintenance manuals.
13. Permits and connection fees.
14. Flashing and counter flashing.
15. All rigging hoisting, transportation and associated work necessary for placement of all equipment in the final location shown.
16. Concrete coring, cutting and patching as a of this work.
17. Trenching, and compacting for work under this section.
18. Painting of exposed piping and supports in accordance with Section 09900, Painting.

1.4 RELATED WORK ELSEWHERE

- A. Section 07 84 13, Fire Stopping.
- B. Section 07 92 00, Sealants.
- C. Section 08 31 13, Access Panels.
- D. Section 09 91 00, Painting.
- E. Section 21 00 00, Fire Protection.
- F. Division 26, Electrical.

1.5 REFERENCE AND STANDARDS

- A. Regulatory compliance: All work performed under this Division shall comply with the latest currently adopted editions of all codes and regulations and all requirements of all Authorities Having Jurisdiction. The following references and standards are hereby made a part of this Section and work shall conform to applicable requirements herein except as otherwise specified herein or shown on the Drawings.
- B. Codes and Standards: Conform to all applicable codes and standards as stated herein and as described in Division 1 of the Specifications, including the following:
 1. American Gas Association (AGA)
 2. American National Standards Institute (ANSI)
 3. Adhesive and Sealant Council (ASC)
 4. American Society of Mechanical Engineers (ASME)
 5. American Society for Testing and Materials (ASTM)
 6. American Society of Civil Engineers (ASCE)
 7. California Building Code (CBC)
 8. California Plumbing Code (CPC)
 9. California Fire Code (CFC)
 10. California Energy Conservation Code, Title 24
 11. State of California Administrative Code (CAC) Titles 8, 17, and 24
 12. California Electric Code (CEC)
 13. National Electrical Manufacturers Association (NEMA)
 14. National Fire Protection Agency (NFPA)
 15. Underwriters' Laboratories (UL)
 16. Comply with all ADA and California Title 24 requirements for disabled access.

17. Division of State Architect, State of California (DSA)
 18. City Fire Marshal requirements
 19. Comply with the latest edition of all applicable standards, including AWWA, PDI, and OSHA
- C. Minimum requirements: The requirements of these are the minimum that will be allowed unless such requirements are exceeded by applicable codes or regulations, in which the regulatory codes or regulation requirements shall govern.
- D. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted Authorities Having Jurisdiction and from the Owner's Representative.

1.6 WORK RESPONSIBILITIES

- A. Site Conditions:
1. Examine all of the drawings and the specifications and survey the existing site conditions.
 2. Resolve all conflicts with code requirements, site conditions, the work of other trades, or other mechanical contractors.
 3. Verify the location of all existing utilities prior to construction and protect from damage.
 4. Pay all costs incurred due to damage of existing utilities or other facilities.
- B. Drawings:
1. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of their work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.
 2. The general intent of the design indicated on the drawings shall be followed as closely as possible. Coordinate with architectural, structural, mechanical and electrical drawings and the work of other trades prior to piping and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Owner's Representative for approval. Only when Owner Representative's approval is given, in writing, shall Contractor proceed with installation of the work.
 3. Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the Owner's Representative may permit the installation to remain. However, all costs incurred to revise the contract drawings by the Engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.
 4. Bring discrepancies between different drawings, between drawings and actual field conditions or between drawings and specifications, promptly to the attention of the Owner's Representative for decision.
 5. Install pipe with all necessary offsets and to conform to the structure. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping equipment shall be installed in such a manner as to avoid all obstruction, preserve

headroom, maintain required accessibility, keep openings and passages clear, and satisfy the requirements of the governing codes and standards of good practice. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

6. Clearances and Openings: Contractor shall cooperate and coordinate their work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to their requirements for equipment and installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
 7. Contractor shall and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.
 8. The architectural drawings and specifications take precedence over the plumbing drawings for location of casework, equipment, lights, diffuser, plumbing fixtures, etc. Contractor shall refer to the drawings, specifications, and review shop drawings for all work, in order to coordinate their work with the other work of the project.
 9. All scaled and figured dimensions are approximate and are given for estimate purposes only. Before proceeding with any work, carefully check and verify all dimensions, sizes, etc.
 10. Drawings are diagrammatic and size and locations of equipment are generally shown to scale. Make use of data in all Contract Documents, and informational documents, and verify this information against field conditions.
 11. As far as possible, the work has been indicated on the drawings in such positions as to suit and accommodate the work of the other trades, but the work as indicated is largely diagrammatic and is shown primarily for clarity. Contractor is responsible for the correct placing of their work and the proper location and connection of their work in relation to the work of other trades.
 12. Where apparatus and equipment have been indicated on the drawings, dimensions have been from typical equipment of the class indicated. Carefully check the drawings to see that the equipment will fit into the spaces provided.
 13. Where equipment is furnished by another Division or others, verify dimensions and the correct locations of this equipment before proceeding with the rough-in of connections.
- C. Responsibility:
1. Be responsible for any cooperative work must be altered due to lack of proper supervision or failure to make proper provision in time. Such changes shall be directly supervised by the Owner's Representative and shall be made to their satisfaction.
 2. Provide complete functioning systems and include all labor, materials and associated tools and transportation required for the system to operate safely and satisfactorily.
 3. Provide all work indicated on the drawings whether or not mentioned in the specifications.
 4. Coordinate the installation of plumbing items with the schedules for work of other trades and other contractors to prevent delays in total work. Assume responsibility for any cooperative work which must be altered due to lack of proper supervision or failure to make proper provisions in time.
 5. Notify the Authority Having Jurisdiction when work is ready for inspection.

D. Coordination of Installation:

1. Bring to the Owner Representative's attention prior to installation any conflicts with other trades which will result in unavoidable contact to the equipment, piping, etc., described herein due to inadequate space, etc.
2. Bring to the Owner Representative's attention any discrepancies between the specifications and field conditions, changes required due to specific equipment selection, etc., prior to installation.
3. Provide written notification to Owner's Representative a minimum of fourteen (14) days prior to a utility shut down.
4. Obtain inspection and approval from the Owner's Representative of any installation to be covered or enclosed prior to such closure.
5. Restoration of Damage: Repair or replace, as directed by Owner's Representative, materials and parts of premises which become damaged as result of installation of work of this Division. Remove replaced parts from premises.
6. Where new pipes are to be connected to an existing pipe or a stub provided under another section, verify location, size, elevation and all other information necessary for connection. This verification shall be done at the start of construction. Should there be a problem, contact the IOR and/or Architect immediately to resolve the problem.

1.7 PERMITS, LICENSES AND INSPECTIONS

- A. Obtain and pay for all permits, fees and inspections required by work under this Section.
- B. Inspections: All work shall be regularly inspected by the Authority Having Jurisdiction. Certificates of approval shall be delivered to the Owner's Representative.

1.8 SERVICE CONNECTIONS

- A. Arrange and pay all costs for utilities required to complete work of this section. Connection to all on-site services, payment of service charges, and provision for the installation of temporary utilities are included.
- B. Certain site utilities are to be connected to and/or extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which is to be connected. In event depth of lines is not sufficient to permit connection in manner indicated; Contractor shall obtain direction from the Owner's Representative before proceeding with this work.
- C. Verify that utility company's size their services and meters to suit ultimate demand indicated on the drawings.
- D. Sanitary Sewer: The Contractor shall be responsible for the soil and waste piping within the building itself.
- E. Domestic Water: The Contractor shall be responsible for the domestic water service within the building itself.

1.9 NOISE AND VIBRATION

- A. Cooperate in reducing objectionable noise or vibration. If noise or vibration, as a result of improper installation, occurs in the building, correct these conditions at no cost to the Owner.

1.10 QUALITY ASSURANCE

- A. Qualifications:
 - 1. For the actual installation and testing of work under this section use only thoroughly trained and experienced work personnel completely familiar with the items required and the manufacturer's current methods of installation.
 - 2. In acceptance or rejection of the finished installation, no allowance will be made for lack of skill.
 - 3. The execution of the work shall be in strict accordance with the best practice of the trades, the intent of this specification, and all codes and ordinances.
- B. Contractor's Qualifications: A firm with at least five (5) years of successful installation experience on projects with plumbing systems work similar and of comparable size and scope to that required for this project. The installer shall have performed at least five (5) similar projects in the San Francisco Bay Area. Contractor shall be prepared to submit written evidence of the installer's experience.
- C. Manufacturer's Qualifications: Firms regularly engaged in manufacture of plumbing products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.
- D. All materials and equipment installed as part of this work shall be new and the manufacturer's current model.
- E. Soldering: Soldering of copper tubing shall be done in accordance with the Copper Development Association Copper Tube Handbook Instruction on Joining and Forming Copper Tube, Soldered Joints. Permits for on-site soldering shall be obtained from DSA/Fire Marshal.
- F. Brazing: Brazing of copper tubing shall be done in accordance with the standards of the American Welding Society or the Copper Development Association. Copper Tube Handbook Instruction On Brazing. Permits for on-site brazing shall be obtained from DSA/Fire Marshal.
- G. Welded Joints: Weld in accordance with procedures established and qualified per ANSI B31.2. Each welder and welding operator shall be qualified for the ANSI procedures as evidenced by a copy of a certified ANSI B31.2 qualification test. Contractor shall conduct the ANSI qualification test. Permits for on-site welding shall be obtained from DSA/Fire Marshal.

1.11 PRODUCTS

- A. Products shall be obtained from local suppliers or suppliers with local representation. Items of the same type shall all be purchased from the same supplier.
- B. Protection: Use all means necessary to protect the materials of this section before, during and after installation and to protect the installed work and materials of all other trades.

- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner's Representative.
- D. Protection of Materials:
 - 1. Protect materials, equipment and apparatus provided under this Division from damage, water, dust, or similar impairment, both in storage and installation until Notice of Completion has been filed. Materials, equipment or apparatus damaged because of improper storage or protection will be rejected and must be removed from site.
 - 2. Cap openings in pipes with manufactured caps or fittings. Do not use taped caps.
 - 3. Protect premises and work of other Divisions from damage arising out of installation of work of this Division.

1.12 REVIEW OF CONSTRUCTION

- A. The Owner's Representative may review work at any time.
- B. Advise Owner's Representative fourteen (14) calendar days in advance that work is ready for review at following times:
 - 1. Prior to backfilling buried work.
 - 2. Prior to concealment of completed Contract items.
 - 3. When requirements of Contract have been completed.
 - 4. Prior to installation of suspended dry wall ceiling.
- C. Do not or conceal work without Owner Representative's consent.
- D. Maintain on job a set of specifications and drawings for use by the Owner's Representative.
- E. Noncompliance: Should any of the work be covered up or enclosed prior to all required inspections and approvals, uncover the work as required and, after it has been completely inspected and approved, make all repairs and replacements with such materials as are necessary to the approval of the Owner's Representative and at no additional cost to the Owner.

1.13 SYSTEM ACCEPTANCE

- A. Final Review: Request a final review prior to system acceptance after:
 - 1. Completion of the installation of all systems required under the Contract Documents.
 - 2. Submission and acceptance of operating and maintenance data.
 - 3. Completion of pipe, valve and equipment identification.
 - 4. Completion of cleaning.
 - 5. Satisfactory operation of all systems for a period of one (1) week.
- B. Acceptance shall be contingent upon:
 - 1. Completion of final review and correction of all deficiencies.
 - 2. Satisfactory completion of the acceptance tests which shall demonstrate compliance with all performance and technical requirements of the Contract Documents.
 - 3. Submission of as-built drawings.

1.14 DAMAGE BY LEAKS

- A. Contractor shall be responsible for damage to any part of the premises caused by leaks in the pipe or equipment installed under applicable sections for a period of twenty-four (24) months from the date of acceptance of the work by the Owner.

1.15 SUBMITTALS

- A. Submit shop drawings and product data in accordance with Section 01600 Product Requirements and as follows:
- B. Submittal Requirements:
 - 1. Submit manufacturer's product brochures for all products. Written descriptions of products are not acceptable. Furnish, all at one time, prior to any installation, submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules. Product submittals shall be bound in a three ring binder, with table of contents and tab set for each system.
 - 2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
 - 3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
 - 4. To be valid, all submittals must:
 - a. Identify project name and location, Contractor's, Subcontractor's, supplier's and manufacturer's name, address, and telephone number.
 - b. Include table of contents.
 - c. Identify manufacturer's name and model numbers.
 - d. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - e. Include all pertinent construction, installation, performance and technical data.
 - f. Have all product data sheets labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - g. Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - h. Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, and item numbers.
- C. Product Data:
 - 1. General: Manufacturer's specifications, data sheets, certified drawings, and installation instructions. Include physical and performance data such as weights, sizes, capacities, required clearances, performance curves, acoustical characteristics, finishes, color selection, and accessories. Include certified drawings on major equipment such as water heaters, pumps and tanks.
- D. Submit product data and brochures for, but not limited to the following:
 - 1. Pipe Material, Fittings and All Piping Specialties.

2. Pipe corrosion protection materials.
3. Unions, Flanges and Dielectric Isolators.
4. Pipe Supports and Seismic Bracing.
5. Escutcheons, Flashing and Sleeves.
6. Fire stopping, including UL listing system numbers and details.
7. Pipe Isolation.
8. Insulation.
9. Valves (all types).
10. Trap Primer Valves.
11. Water Hammer Arrestors (Shock Absorbers).
12. Drains, Cleanouts and Vent Caps.
13. Access Doors.
14. Pipe and equipment markers, and valve tags.
15. Flexible Connectors and Seismic Joints.
16. Plumbing Fixtures and Trim.

E. Shop Drawings:

1. General: Prepare and submit plans, sections, details and diagrams to required scales for specified areas. Drawings shall be prepared using AutoCAD 2000 software. Drawings shall be coordinated, dimensioned and indicate equipment, pipe, duct, fire protection, and electrical in relation to architectural and structural features. Include minor piping, drains, etc. Indicate exact locations and elevations of valves, piping specialties, access doors, etc. Complete and detailed shop drawings of a scale equal to or larger than the design documents shall be maintained throughout the coordination and construction phase indicating all equipment trades' work clearly. All equipment including piping, etc. shall clearly indicate both top and bottom elevations as well as distances from equipment to established building lines. Coordinate with other trades and field conditions and show dimensions and details including building construction and access for servicing.
2. Use of contract documents for shop drawings is not acceptable.
3. Required Drawings: Prepare and submit drawings for all areas and all plumbing work. Scale shall be minimum 1/4"=1'-0" in mechanical rooms, toilet areas, and a minimum 1/8"=1'-0" elsewhere.

1.16 SUBSTITUTIONS

- A. Base manufacturer is indicated in the equipment schedules and specifications. In specification, additional acceptable manufacturers may be indicated. Other manufacturers, materials, or methods shall not be used unless approved in writing by the Owner's Representative. The burden of proof as to the equality of any proposed substitute manufacturer, material, or method shall be upon the contractor. Substitutions, shall be submitted as follows:
1. Requests for substitution review and acceptance shall be accomplished by table of comparison listing pertinent features of both specified and proposed materials, such as material of construction, replacement or maintenance access, motor type, horsepower, voltage, phase, service factor. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for specified item shall be placed side by side with product data sheets for the corresponding proposed substitution item within the submittal. In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly

- labeled "PROPOSED SUBSTITUTION". Review of proposed substitutions will not be made until receipt of satisfactory comparison tabulation.
2. Provide calculations and other detailed data justifying how items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
 3. It shall be the responsibility of the Contractor to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and re-submittal will not be allowed.
 4. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
 5. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all of the proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
 6. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
 7. The Owner or their authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Owner or that of their representative shall be final and conclusive.
 8. Submittal of substitutions shall be limited to one proposal for each type or kind of item, unless otherwise permitted by the Owner's Representative. If first proposed product submittal is rejected, Contractor shall submit the first-named or scheduled product.
 9. Contractor shall be responsible for all costs and coordination due to the substitution, such as impacts on electrical requirements, weights, openings in slabs and roofs, structural framing, housekeeping pad size, etc.
 10. All costs incurred to revise the contract drawings by the Engineer for re-submittal to the building department or Authority Having Jurisdiction, indicating the as-installed condition, shall become the responsibility of the Contractor.

1.17 RECORD DRAWINGS

- A. Record of Job Progress: Keep an accurate dimensional record of the "As-built" locations of all work as required. This record shall be kept up-to-date on prints as the job progresses and shall be available for inspection at all times. In addition, record drawings are to be used by the Owner's Representative for job review and field inspections.
 1. Where enlarged plans are provided in the construction set, contractor markups shall be kept on the enlarged plans.
- B. "As-Built" documentation shall be transmitted to the Owner within ten (10) days after Owner Representative's acceptance of the completed installation. As-built documentation shall include the following (Unless noted elsewhere, furnish number of copies indicated):
 1. Three copies of white bond as-built. One (1) copy of final AutoCAD drawing files shall also be provided on CD disk.

2. Four (4) sets of manufacturer's literature and data updated to include submittal review comments and any equipment substitutions.
 3. Four (4) sets of operation and maintenance data updated to include submittal review comments and any equipment substitutions.
 4. Manufacturer's literature, reports and operation and maintenance data shall be in a labeled three (3) ring binder.
- C. Submit in accordance with Section 01720 Project Record Drawings and Section 01725 Electronic Documentation of Project.

1.18 OPERATION AND MAINTENANCE DATA

- A. The installing contractor shall provide:
1. All literature and instructions provided by the manufacturer describing proper operation and maintenance of any equipment and devices installed.
- B. Data shall include, but is not limited to the following: list of all equipment with manufacturer's name, model number, local representative, service facilities and normal channel of supply for each item. O&M manuals shall be bound in a three (3) ring binder, with table of contents and tab set for each system. "Operation and Maintenance to match "Product Submittals".
1. System Description: Description of start-up and operating procedures.
 2. Controls: Diagrams and description of operating sequence of each system.
 3. Equipment: Manufacturer's brochures, ratings, certified shop drawings, lubrication charts and data, parts list with parts numbers. Mark each sheet with identification number and actual installed condition.
 4. Materials and Accessories: Manufacturer's brochures parts lists with part numbers and lubrication data where applicable. Mark each sheet with equipment identification number or system and location of installation; and to specifically identify which options are provided (in case where data sheet shows multiple options).
 5. Certificate of factory tests and code compliance as specified.
 6. Recommend preventive maintenance schedule and procedures.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES AND TRIM

- A. Refer to plumbing fixture schedule in construction documents for fixture specifications.
1. Fixtures and equipment shall be certified by the State Authorities and comply with the efficiency standards and water usage requirements of State and Local Authorities.
- B. General: Provide factory fabricated fixtures of type, style and material indicated.
1. Plumbing Fittings, trim and accessories:
 - a. Water Outlets: At locations where water is supplied (by manual, automatic or remote control), provide commercial quality faucets, valves or dispensing devices of type and size indicated. Include manual shutoff valves and connecting stem pipes to permit outlet servicing without shut-down of water supply piping systems. Stop valves shall be provided at each fixture.

- b. Vacuum Breakers: provide with flush valves and water outlets equipped for hose attachment.
- 2. Provide materials which have been selected for their surface flatness and smoothness. Exposed surfaces which exhibit pitting seam marks, roller marks, foundry sand holes, stains, discoloration or other imperfections on finished units are not acceptable.
- 3. Where piping, fittings, trim and accessories are exposed or semi-exposed provide bright chrome plated or polished stainless steel units. Provide copper or brass where not exposed.
- 4. Escutcheons: Where fixture supplies and drains penetrate walls, provide chrome plated brass escutcheons. Provide box style escutcheons for p-trap penetrations.
- 5. Stainless steel fixtures conforming to ANSI A112.19.3M. Type 302/304, hardest workable temper. Finish shall be No., 4, bright, directional polish on exposed surfaces, or as indicated.
- 6. Vitreous China: White vitreous china unless otherwise noted. Fixtures conforming to ANSI A1 High quality, from fire cracks, spots, blisters, pinholes and specks; glaze exposed surfaces, and test for crazing resistance in accordance with ASTM C-554.
- 7. Traps: Lavatory and sink p-traps shall be commercial grade, chrome plated cast brass body with cleanout, with 17-gauge brass adjustable wall bend, cast brass nipple, 17-gauge tube, and cast brass slip nuts. No reducing washers allowed. Trap shall be provided with forged brass with brass box style escutcheon. Traps to have a 2" water seal and rough-in complete. Trap adapter extensions are not allowed. Trap shall be by CSA or other recognized testing authority and bear manufacturers name. Brasscraft Commercial, McGuire, or Zurn Commercial.
- 8. Lavatory and sink water supply shall be heavy duty commercial grade and include chrome plated all-brass stops with all-brass stem (no plastic stems allowed) and loose-key handle. Kits shall have chrome plated flexible copper risers and deep forged brass with setscrew flange, and have EPDM washers. Inlet shall be IPS with chrome plated nipple. Supply riser lengths to conform to fixture manufacturers recommended rough-in dimensions. Outlets shall be compression. Stops shall be certified to 200psi line pressure. Supply kit shall be certified by CSA or other recognized testing authority, bare manufacturers name and comply with the SDWA (Safe Water Act) "No Lead" restrictions AB1953. Supply kits shall be Brasscraft Commercial, McGuire, or Zurn Commercial.
- 9. Lavatory grid drains to have chrome plated cast brass strainer (with overflow for lavatories with overflow drains) with brass lock nut. Drain tailpiece shall be seamless brass tube and a 6" long. Provide offset type for ADA accessible fixtures. Grid drain shall be certified by CSA or other recognized testing authority. Drain body shall bear manufacturers name so as to be visible after installation.
- 10. Product submittals for p-traps and lavatory grid drains shall include documentation that product is CSA listed or other recognized testing authority.
- 11. Water Connections: Shall have rigid metal to metal connections. Slip joints utilizing non-metallic washers are not permitted. All fixtures shall have stops or valves. All stops shall be lock-shield type, unless otherwise noted.
- 12. Provide Schedule 40 red brass nipples at copper lines serving fixtures. Galvanized nipples are not allowed.
- 13. Fixture Supports:
 - a. Carriers: Fixture supports for all off-floor plumbing fixtures conforming to ANSI A1 Provide floor mounted commercial grade cast-iron supports for fixtures of either graphitic gray iron, ductile iron, malleable iron, or steel as indicated. Carriers for water closets shall be rated to support loads of up to 500 lbs, horizontal discharge for narrow wall. Submittals

indicate that water closet carriers can meet this requirement. Provide cast iron nipples and couplings for water closets and urinals. ABS is not acceptable. Carriers shall be manufactured by J.R. Smith or Zurn.

- b. Backing: For fixtures other than those specified or required to be furnished with carriers, 1-1/4" x 6" wide steel flat plate welded to steel studs or secured to brick or concrete, drilled and tapped to match hanger. Also install backing where bottom of fixture meets wall. Bolt fixtures to backing through holes in fixture casting.
- 14. Fixture Bolt Caps: Provide manufacturer's standard exposed fixture bolt caps finished to match fixture finish.
 - 15. Flush Valve Supports: All flush valves shall be installed to prevent movement. Supply pipe serving flush valves shall be installed with Holdrite #102-26 flush valve support (#114-C for wall mounted water closets). Supply pipe to be soldered to the support.
 - 16. Accessible Fixtures
 - a. All exposed lavatory and sink trim under the fixture on wheelchair accessible fixtures shall be covered with a white anti-microbial vinyl insulating outer shell. Material shall be flame retardant and fungal and bacterial resistant. Insulating kits shall include covers for drain tailpiece, drain offsets, all p-trap components and hot and cold water supplies including supply risers. Insulation kits shall be Truebro Lav Guard 2, or equal.
 - b. Shall meet the requirements of the Americans with Disabilities Act (ADA).

2.2 SOIL, WASTE & VENT PIPING SYSTEMS

- A. Above and Below Ground: No-hub cast iron soil pipe and fittings manufactured from gray cast iron with a tensile strength of not less than 21,000 psi, bituminous coated interior and exterior, conforming to the requirements of ASTM A888 and CISPI Standard 301. Each length of pipe shall be hydrostatically (water) tested by the manufacturer to verify compliance. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and listed by NSF international. All pipe and fittings shall be of the same manufacturer.
- B. No Hub Couplings:
 - 1. Above Ground: No-hub couplings shall comply with CISPI 310 and bear the NSF trademark. No-Hub couplings shall be constructed of Type 304 stainless steel with 305 stainless steel worm drive screws. The worm drive clamps shall have a hexagon head to accept a 3/8 inch socketed torque wrench. The clamps shall be tightened to a minimum of 80 inch pounds. (Single corrugated shield, 4 band 80 inch pound torque or 2 band 80 inch pound torque minimum). The gasket material shall be neoprene rubber meeting the requirements of ASTM C-564. Submittal to include copy of compliance to the requirements of FM 1680 Class I by certified independent third party testing laboratory. No-Hub couplings shall be Husky SD2000 or Clamp-All High Torq 80. No coupling reducing fittings allowed.
 - 2. Below Ground: No-hub couplings shall comply with CISPI 310 and all requirements of Factory Mutual 1680 Class I, 15 PSI rated pressure. No-Hub couplings shall be constructed of Type 304 stainless steel with 305 stainless steel worm drive screws. The worm drive clamps shall have a hexagon head to accept a 3/8 inch socketed torque wrench. The clamps shall be tightened to a minimum of 80 inch pounds. (Single corrugated shield, 4 band 80 inch pound torque or 2 band 125 inch pound torque

minimum). The gasket material shall be neoprene rubber meeting the requirements of ASTM C-564. Submittal to include copy of compliance to the requirements of FM 1680 Class I by certified independent third party testing laboratory. No-Hub couplings shall be Husky SD4000 or Clamp-All High Torq 125. No coupling reducing fittings allowed.

2.3 DOMESTIC HOT AND COLD WATER PIPING SYSTEMS

- A. Above Ground:
 - 1. Copper Tube: Type 'L', hard-drawn temper, ASTM copper tubing with ANSI B16.22 wrought copper sweat type fittings. Pipe shall be NSF 61 Certified and bear the NSF Certification mark. Submittal to include that pipe is NSF 61 certified.
 - 2. Solder for Copper Piping: Lead-free, antimony-free, cadmium-free, non-toxic solder, 95.5% tin, 4% copper and 0.5% silver. Engelhard 100, or equal.
 - 3. Mechanically formed tee fittings are not acceptable.
 - 4. Fittings: Wrought copper or cast brass solder sweat type.
- B. Below Ground:
 - 1. Tube Size 3" and Smaller: Copper tube; Type "K", hard-drawn temper; wrought-copper fittings, brazed-joints, long radius elbows. Pipe shall be NSF 61 Certified and bear the NSF Certification mark. Submittal to include documentation that pipe is NSF 61 certified.
 - 2. Piping below building floor shall be Type "K" soft annealed copper tubing with no fittings below the slab.
 - 3. Solder for Copper Piping: Lead-free, antimony-free, cadmium-free, non-toxic solder, 95.5% tin, 4% copper and 0.5% silver. Engelhard 100, or equal.
 - 4. Trap primer: use plastic-coated tube, Streamline 'PlumbShield' or equal plastic coated Type K tubing. Comply with manufacturer's installation instructions.
 - 5. Provide concrete thrust blocks at all changes in direction, changes in size, stops and dead ends, and at valves where thrusts may be expected.

2.4 DRAINS

- A. Conforming to ANSI A1.
- B. Coated cast iron body, except as noted, with integral double drainage flange, weep holes and inside caulked bottom or no-hub outlet.
- C. Provide cast iron P-trap at all floor drains, floor sinks and trench drains. All floor drains to have trap primers.
- D. Coordinate drain, area drain, trench drains, and floor sink rim elevations to be flush with finish floor and at low point of floor.

2.5 TRAP PRIMER VALVES

- A. Corrosion resistant brass containing no springs or diaphragms, activated by a 5 to 10 psi pressure drop, provide with distribution unit where serving 2 to 4 drains, ASSE 1018 certified

and Listed with Precision Plumbing Products Model P-1 & P-2 with DU Series distribution unit, or equal.

- B. Provide trap primers for all floor drains including piping floor drain to trap primer valve. Provide shut-off valve upstream of trap primer valve.
- C. When concealed, provide access panel for maintenance or replacement. Use size appropriate for access.

2.6 CLEANOUTS

- A. Conforming to ANSI A112.36.2. Cleanouts shall be manufactured by J.R. Smith or Zurn.
- B. Cast bronze, full size up to four inch.
- C. Floor Cleanouts: J.R. Smith Fig. 4026-U-F-C, coated cast iron adjustable floor cleanout with inside caulk connection, flange with flashing clamp, internal bronze plug, scoriated round nickel bronze cover secure to rim with vandal-resistant screws.
- D. Wall Cleanouts: J.R. Smith fig. 4422C-U and fig. 4532S-U, cast bronze taper thread plugs with stainless steel cover and vandal-resistant screws. Screw length as required meeting installation requirements. Wall cleanouts shall be located a minimum of 18" above finished floor.

2.7 VALVES

- A. General:
 - 1. All valves used for domestic water shall meet the criteria of California AB1953 low lead provisions.
 - 2. Provide all valves of first quality of approved manufacturer, have proper clearances, and be tight at the specified test pressure. Mark on each valve the maker's name or brand, the figure or list number, and the guaranteed working pressure cast on the body and cast or stamped on the bonnet, or provided with other means of easy identification.
 - 3. All valves must be of the product of one manufacturer, except for special application. Figure numbers of manufacturers are listed to indicate the types selected for design, performance and standard of quality and appearance.
 - 4. Valve Design: Rising stem or outside screw and yoke stems. Non-rising stem valves may be used where space conditions prevent full extension of rising stems. Provide Class 150 valves meeting the valve specifications where Class 125 valves are specified but are specified but are not available.
 - 5. Sizes: Same size as upstream pipe, unless otherwise indicated.
 - 6. Operators:
 - a. Hand wheels fastened to valve stem for all valves other than quarter turn.
 - b. Lever handles on quarter-turn valves, 6 inch and 8 inch and larger gear operated, except for plug valves. Provide plug valves with square heads and operating wrench. Provide gear operator for valves 8 inch or larger.
 - 7. Extended stems: Where insulation is indicated, or specified, provide extended stems arranged to receive insulation.
 - 8. End Connection: Valves 2" and under shall be sweat or threaded 2-1/2" and larger shall be flanged or full lug style.

9. Figure numbers of manufacturers are listed to indicate the types selected for design, performance and standard of quality and appearance.
- B. Ball Valves: MSS SP-110; rated for 150 psi saturated steam pressure, 600 psi WOG pressure; full port, two or three-piece bronze body construction, chrome plated solid bronze ball, blowout proof stem, reinforced "Teflon" seat and seals, separate adjustable packing gland and nut, and vinyl covered steel handle. Provide locking type handle where required.
 1. Valves 2" and Smaller: Nibco T/S-685-80-LF, Watts Series LFB6080/LFB6081 or equal.
 2. Valves 2-1/2" and Larger: Use butterfly valve.
- C. Butterfly Valves: MSS SP-67; rated at 200 psi, body conforming to ASTM A 126, Class B. Provide full lug style valves with field replaceable EPDM phenolic backed sleeve, aluminum bronze disc, stainless steel stem, and EPDM O-ring stem seals. Provide lever operators with locks.
 1. Nibco LD-2000, Watts Model BF03-121-45/BF03-121-4G or equal.
- D. Check Valves:
 1. Swing Check Valves: 2" and Smaller: MSS SP-80; Class 125, 200 psi WOG, cast-bronze body and cap conforming to ASTM B 62; with horizontal swing, Y-pattern, and bronze disc. Provide valves capable of being refitted while the valve remains in the line.
 - a. Nibco T/S-413-Y-LF or equal.
 2. Swing Check Valves: 2-1/2" and Larger: MSS SP-71; Class 125, 200 psi WOG, cast iron body and bolted cap conforming to ASTM A 126, Class B; horizontal wing, and bronze disc or cast-iron disc with bronze disc ring, flanged ends. Provide valves capable of being refitted while the valve remains in the line.
 - a. Nibco F-918-N or equal.
 3. Lift Check Valves: 2-Inch and Smaller: Class 125; cast-bronze body and cap conforming to ASTM B 62; horizontal or angle pattern, lift-type valve, with stainless steel spring, bronze disc holder with renewable "Teflon" disc. Provide valves capable of being refitted and ground while the valve remains in the line.
 - a. Nibco or equal.
 4. Non-Slam Check Valves: Provide non-slam check valves on the discharge of pumps. Check valves to be silent closing, class 125, iron body, bronze mounted spring loaded center guide.
 - a. Valves 2" and Smaller: Nibco T/S-480-Y-LF or equal.
 - b. Valves 2-1/2" and Larger: Nibco F-910-B or equal.
- E. Water Pressure Relief Valves: Provide ASME labeled, bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, Wilkins No. P174A, Watts, or equal.
- F. Combination Pressure and Temperature Relief Valves: Provide ASME labeled, adjustable bronze spring and diaphragm combination pressure and temperature type with test lever and automatically reseating type thermostatic element, Relief valve shall be type as recommended by the water heater equipment manufacturer.
- G. Balancing Valves: Fully assembled, forged brass body, 304 stainless steel parts, EPDM O-rings, 20 mesh stainless steel strainer, nickel-plated brass ball valve, 400 psi/250°F rated, accessible flow control cartridge, ports for testing, Griswold Isolator "R" Series, or equal.

2.8 WATER HAMMER ARRESTORS (SHOCK ABSORBERS)

- A. Every effort shall be made by the contractor to alleviate hydraulic shock (water hammer). Should water hammer be present in the final installation and water hammer arrestors have not been installed as noted by this specification and all the authorities named within, it shall be the responsibility of the contractor to provide water hammer arrestors per this specification at no additional cost to the Owner.
- B. Locate and size per Plumbing and Drainage Institute Manual WH-201.
- C. Provide water hammer arrestors in water lines to equipment or fixtures having quick closing valves, flush valves, sensor operated metering faucets, mechanical metering faucets, foot pedal valves, knee operated valves, and any equipment that might produce water hammer.
- D. Water hammer arrestors shall be certified by the Plumbing and Drainage Institute (PDI). Water arrestors shall have threaded stainless steel casing, partially filled with liquid and charged with gas as required for line pressure, stainless steel or neoprene bellows, J.R. Smith "Hydrotrol" or Zurn "Shocktrol".
- E. When concealed, provide access panel for maintenance or replacement. Use size appropriate for access.
- F. Provide 6" brass nipple at connections to copper lines.

2.9 CORROSION PROTECTION

- A. All buried copper and steel piping and fittings shall be cleaned, primed then protected by wrapping.
 - 1. Piping 3" and smaller: Prime pipe and machine wrap pipe using 50% overlap wrap, with polyvinyl chloride tape. Hand wrap fittings using 100% overlap wrap extending 6" beyond fitting onto wrapped pipe. Comply with tape manufacturer's installation instructions. Wrap pipe with 3M "Scotchrap 51" corrosion protection tape (20 mils thick) and pipe primer, or equal.
 - 2. Piping 4" and larger: Encase in 8 mil polyethylene tube encasements in accordance with ANSI/AWWA A21.5/C105 and manufacturer's instructions.
 - 3. All below ground metallic fittings, valves, flanges, bolts, shall be protected against corrosion as follows:
 - a. All metallic components as described above shall receive a heavy coating of "Henry's" oil base roof mastic, or equal.
 - b. After mastic coating is completed and inspected, wrap entire metallic component with a minimum of 10 mils. polyethylene wrap as manufactured by Visqueen or equal, overlapped 50% of the circumference and extended beyond ends of component as required for polyethylene to be secured to piping. The overlap seam shall be located to avoid material from entering the encapsulate area. The ends and seam of the of the polyethylene material shall be secured to the piping and sealed with 3M "Scotchrap 51" corrosion protection tape (20 mils thick) and pipe primer, and 2" wide pipe wrap sealing tape.
 - c. The mastic coating shall be inspected and approved prior to the finish application of the polyethylene material, which shall also be inspected.

2.10 PIPE SUPPORTS, ANCHORS, AND HANGERS

- A. Unless detailed on the drawings, all piping shall be supported with, B-Line, Grinnell, Super Strut, Tolco, or equal, pipe hangers and supports. All hangers and supports furnished for this installation shall be of one manufacturer. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide felt lined hangers for copper piping systems.
- B. Special pipe supports for piping in equipment and other locations where shown on drawings shall be constructed as detailed on drawings. Unless otherwise shown on drawings, support channels, frames, brackets, and legs of special supports shall be made of B-Line, Grinnell, Super Strut, Tolco, Unistrut, or equal channels, attaching clips, pipe clamps, and other required accessories. Piping installed within partitions and connected to plumbing fixture trim shall be securely attached to adjustable stud brackets, not more than 2-feet away from and on the inside of wall penetration.
- C. Hanger Rods: Hanger rod size shall be no less than the standard rod sizes listed on the MSSSP-69. Rods shall be steel rods, threaded at ends only with a minimum safety factor of 5 over the imposed load, Tolco Fig. 103, or equal. All thread rods are not acceptable. Provide rod stiffeners as required.
- D. Where beam clamps are used, provide beam clamp retaining strap.
- E. Powder-driven and explosive type fasteners are not allowed.
- F. Equipment Support Members: Install AISC steel beams to accommodate support for pipe and equipment from above when it is not practical to install concrete anchors.
- G. No metallic pipes shall have metal-to-metal contact with hangers, clamps, brackets, or any other pipe support, or be otherwise in direct contact with any part of the building structure.
- H. Finish of all pipe supports attachments, rods, hangers, etc., shall be galvanized or cadmium plated.
- I. Steel for Equipment Support: Support steel shall be of new material conforming to ASTM A36, latest edition. Brackets, supports, etc., fabricated from ferrous metal shall be hot dipped galvanized after fabrication. Steel hangers shall have a safety factor of 4.0 or greater.
- J. Miscellaneous Steel, Bolts, Nuts, Washers, Etc.: Miscellaneous steel angles, channels, brackets, rods, clamps, etc., shall be of new materials conforming to ASTM A36. All steel parts exposed to weather or where noted shall be hot dipped galvanized after fabrication.
- K. All bolts and nuts, except as otherwise specified, shall to ASTM "Standard Specifications for Low Carbon Steel Externally and Internally Threaded Standard Fasteners", Designation A307. Bolts shall have heavy hexagon heads, and nuts shall be of the hexagon heavy series. All bolts, washers, nuts, anchor bolts, screws and other hardware, unless otherwise specified, shall be galvanized, and all galvanized nuts shall have a free running fit. Bolts shall be of ample size and strength for the purpose intended.
- L. Concrete Anchors:

1. For New Concrete Slabs with Metal Decking: B-Line, Hilti, Red Head, or equal, steel deck inserts or wedge type expansion anchors.
 2. For New Concrete Floor or Base: B-Line, Hilti, Red Head, or equal, hook bolts, wedge type expansion anchors, or Deco adjustable concrete anchors.
 3. For Existing Concrete Slabs: B-Line, Hilti, Red Head, or equal, self-drilling concrete anchors. Locate anchors to clear rebar.
 4. Maximum loading on inserts and rods shall not exceed 75 percent of ratings.
 5. Powder actuated fastening systems will not be allowed.
- M. Insulated pipes shall be supported with Pipe-Shield, Inc., Model "CS-CW" unless otherwise noted, or equal, pipe hanger shield with waterproofed calcium silicate insulation encased in a galvanized-sheet metal shield completely around the pipe. Shield shall be 26 gauge for pipes up to 1", 22 gauge for 1-1/4" and 1-1/2", 20 gauge for 2" to 8" in size, and 16 gauge for 10" and larger. Insulation shall be same thickness as pipe insulation.

2.11 SEISMIC RESTRAINTS

- A. General Requirements: Seismic restraints shall be provided for all vibration isolated equipment, both supported and suspended, and all vibration isolated piping.
- B. Where anchorage details are not shown on the drawings, the field installation shall be subject to the approval of the mechanical engineer and the project inspector.
- C. All mechanical equipment shall be braced or anchorage to resist horizontal force acting in any direction using the following criteria:
1. The total design lateral seismic force shall be determined from ASCE 7 Section 13.3.1, California Building Code (CBC) 2016. Forces shall be applied in their horizontal directions, which result in the most critical loadings for design. The value of a_p (component amplification factor) and R_p (component of modification factor) of Section 13.3.1 shall be selected from Table 13.6-1, ASCE 7. The value of I_p (seismic importance factor) and S_{DS} (special acceleration) shall be selected from Section 13.1.3 and Section 11.4.4, ASCE 7, respectively.
- D. For Supported Equipment:
1. Pre-approved isolator restraint system by the State of California and bear approval number.
 2. Submittal shall include load versus deflection curves up to 1/2" in the x, y, and z planes. Tests shall be conducted in an independent laboratory or under the signed supervision of an independent registered engineer. The snubber assemblies shall be bolted to the test machine as the snubber is normally installed. Test reports shall certify that neither the bridge bearing neoprene elements nor the snubber body has sustained any obvious deformation after release from the load.
 3. Submit calculations for each seismic restraint and vibration isolation signed by structural Registered Engineer.
- E. Seismic Restraint Systems for Piping:
1. All seismic bracing required shall be installed as per Chapter 13 of ASCE 7-05 except as modified by Section 1615A of the 2016 CBC.
 2. Piping distribution systems shall be braced to resist forces prescribed in ASCE 7-05 Section 13.6.7 and 13.6.8 respectively.

3. The bracing and attachments to the structure shall comply with one of the OSPD Pre-Approvals with OPA #, such as B-Line (OPA 0114), Mason Industries (OPA 349), ISAT (OPA 485) as modified to satisfy anchorage requirements of ACI 318 D.
4. Copies of the manual shall be on the jobsite prior to starting hanging and bracing of the pipe distribution systems.

2.12 PIPE ISOLATION

- A. All piping which is not isolated from contact with the building by its insulation shall be installed with a manufactured type isolator. Isolators shall be B-Line "Vibra Clamp" and "Vibra Cushion", Super Strut, "Trisolator", or equal. Piping shall be installed and supported in a manner to provide for expansion without strains. Guides shall be properly installed to ensure this requirement.
- B. Provide pipe and sound isolation for all piping through walls, Acoustoplumb by LSP Products, Holdrite Silencer by Hubbard Enterprises, or equal.

2.13 PIPE INSULATION

- A. General: Conform to NFPA Section 90A, with special regard to the fire hazard requirements of ASTM E84 and NFPA No. 255, latest revision, including vapor barriers and adhesive. All insulation shall be UL listed and shall meet all code requirements, minimum California State Energy Code Title 24. Insulation shall be Owens Corning, Johns-Manville, or equal.
- B. Fire Hazard Rating: Insulation, jackets, facings, adhesives, coatings, and accessories shall be acceptable to the Fire Marshal, and shall not exceed the following fire hazard classifications: Flame-spread: Maximum 25, Fuel Contributed: Maximum 50, Smoke Developed: Maximum 50. Rating to be in accordance with UL Test Method for Fire Hazard Classification of Building Materials, No. 763.
- C. Domestic Cold, Hot Water, Hot Water Return: Fiberglass, Heavy Duty 25ASJ/SSL, heavy density, UL listed non-combustible fiberglass segmented pipe insulation with an integral vapor barrier jacket. The jacket shall have a pressure sealing lap adhesive. Insulation density shall be between 4 and 7 PCF. Insulate cold water piping in concealed areas and warm (heated) areas with minimum insulation. Insulate exterior cold water piping with 1" insulation. Insulation for hot water shall comply with California Title 24 requirements. Required thickness shall be a function of the pipe size as indicated below.
- D. Indoor Piping -Fluid Temperature Range (105°F and Above):

| Pipe Diameter | Insulation Thickness |
|------------------------|----------------------|
| 1" and smaller | 1" |
| Up to and including 2" | 1.5" |
| 2-1/2" and larger | 1.5" |

E. Outdoor Piping -Fluid Temperature Range (105°F and Above):

| Pipe Diameter | Insulation Thickness |
|------------------------|----------------------|
| 1" and smaller | 1" |
| Up to and including 1" | 1.5" |
| 1-1/4" and larger | 2" |

- F. Insulate fittings, valves, joints, expansion joints, and couplings with insulation of same material and thickness as adjoining pipe. Use pre-molded fiberglass covers or radical mitered segments of pipe insulation. For valves, expansion joints, fittings and accessories requiring servicing or inspection, insulation shall be removable and replaceable without damage. Enclose within two-piece no. 15 gauge aluminum covers fastened with cadmium-plated bolts and nuts. Concealed items shall be labeled. Unions and flanges, strainers, air chambers and water arrestors, need not be insulated.
- G. All insulation shall be continuous through walls, sleeves, pipe supports and hangers, and other pipe penetrations.
- H. Finish insulation at supports, protrusions and interruptions. No hangers or supports shall be embedded in insulation.
- I. For exterior applications and piping exposed to weather, provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover piping and all fittings with 0.016" aluminum or stainless steel jacket (meeting ASTM B209) with moisture barrier, and with two 318" wide 0.015" thick aluminum or 0.010" thick stainless steel bands per 3 feet section (18" on center), completely watertight. Lap all joints 2" minimum and seal per manufacturer's recommendations. Locate seams on the bottom side of horizontal piping.
- J. All insulated piping drops exposed in finished areas shall be jacketed in stainless steel jacket, secured and sealed around pipe to prevent entrance of water during cleaning process.
- K. Insulated pipes shall be supported with Pipe-Shield, Inc., Series A-9000, or equal, pipe hanger shield with waterproofed calcium silicate insulation encased in a galvanized sheet metal shield completely around the pipe. Shield shall be 26 gauge for pipes up to 1-1/2", 22 gauge for 2", 20 gauge for 2-1/2" to 8" in size, and 16 gauge for 10" and larger. Insulation shall be same thickness as pipe insulation. Provide calcium silicate insulation with insulation protection saddles and shields at pipe hangers. Insert sections shall be installed on all insulated piping located centrally under each hanger where the insulation rests on hanger. Vapor barriers and jacketing continuous over insert.

2.14 ESCUTCHEONS, FLASHINGS AND SLEEVES

- A. Provide sleeves for each pipe passing through footings, foundations, walls, partitions, floors, roofs and other locations where needed, whether shown or not.

- B. Piping penetrating below grade exterior walls and floors, and floors in all food service areas including pantries, shall be sleeved and made watertight using Thunderline "Link Seal" sealer, or equal.
- C. Sheet metal pipe sleeves: Fabricate from galvanized sheet metal; round tube closed with snap lock joint, welded spiral seams, or welded longitudinal joint. Fabricate from the following gauges: 3" and smaller, 20 gauge; 4" to 6", 16 gauge; over 6", 14 gauge. Adjustocrete, Sleevecrete, or equal.
- D. Set all pipe sleeves and inserts in place before concrete is poured. Coordinate the placing of these items to avoid delaying concrete placing operations.
- E. Sleeves for insulated piping shall be of adequate size to accommodate the full thickness of pipe covering with clearance for packing and caulking. Provide galvanized steel pipe sleeve, minimum 18 gauge, sized for maximum 1 inch space between insulation and sleeve. Omit specified insulation and apply same thickness of UL approved insulation through thickness of wall and extending 1" either side. Provide UL rated ceramic fiber packing. Pack space between sleeve and insulation with packing and seal ends with approved seal. Seal shall be positively fastened using metal plates, or escutcheons. Commercial pipe sleeve assemblies which are UL rated and which have been approved by the fire marshal for this purpose shall be used. Pipe Shields Inc. F1000 series or equal. Use only assemblies which have been designed for the service on which they are to be used.
- F. Caulk space between sleeve and pipe or pipe covering through rated walls, partitions, and floors with fire rated, incombustible, UL listed, permanently plastic, waterproof non-staining compound leaving a finished, smooth appearance. Fire stopping shall be in accordance with specification Section 07 84 13, Fire Stopping and Smoke Seals. Provide supporting backing to secure material in place.
- G. Provide sleeves as follows:

| SLEEVE LOCATION | SLEEVE MATERIAL |
|---|---|
| Interior Wall, Partitions | Galvanized sheet metal |
| Membrane Waterproof Floor and Roof Construction | Standard weight black steel pipe with flashing clamp device welded or threaded to pipe sleeve. Flashing clamp device J.R. Smith 1720 or equal by Zurn |
| Non-membrane Floor Construction | Standard weight black steel pipe |
| Footings and Foundations | Schedule 40 galvanized steel pipe |
| Exterior Walls | Standard weight galvanized steel pipe with a continuously welded water stop of 1/4" steel plate extending from outside of sleeve a minimum of 2" all around |

- H. Escutcheons, Finish and Plates:

1. Smooth up rough edges around sleeve with plaster.
2. Provide escutcheon plates where exposed pipes pass through walls, ceilings, or floors, in all finished rooms and conspicuous locations. Provide chrome or nickel plated plates sized to fit pipe and pipe covering and give a finished appearance. Escutcheons held in place by set screws allowing enough clearance to care for expansion and shall be sufficient size to cover the opening around the pipe. Provide plates on pipes extending through sleeves.

2.15 VENT THROUGH ROOF

- A. Provide Stoneman No. 1100-5, one (1) piece, four (4) pound, series with reinforcing steel boot counter-flashed with cast iron flashing sleeve and equipped with vandal-proof hood for all vent piping. Seal joint between flashing and pipe with waterproofing compound.
- B. All vents through roof shall be provided with vent caps that have cast iron sleeve and dome secured with recessed Allen key set screws. Vent caps shall be manufactured by J.R. Smith or Zurn.

2.16 ACCESS DOORS AND PANELS

- A. Furnish under this Division where shown and required by Regulatory Agencies for access to all concealed valves, water arrestors, unions, etc. Doors shall be in accordance with requirements of Section 08 31 13. Doors in this Division, Section 08 31 13, and Division 26 shall be from same manufacturer for identical appearance and keying. Sizes: 24" x 24" inches' minimum for ceilings and 12" x 12" minimum for walls. Doors shall be furnished with cylinder locks. Furnish fire rated doors when located in rated construction. Deliver doors for installation under Section 08 31 13. Mark each door to accurately establish its location.

2.17 IDENTIFICATION OF PIPING AND EQUIPMENT

- A. Above ground piping:
 1. All piping are to be identified as follows: Brady Perma-Code, MSI Marking Services Inc., or equal, pressure sensitive pipe markers consisting of pipe content wording and arrow indicating directions of flow on ANSI color background. Arrow and wording are two separate markers which shall be placed immediately adjacent to each other. Provide at each end of each marker, two and one-fourth inch wide self-sticking clear tape around periphery of pipe or insulation to further secure marker. All markers shall be applied to clean surfaces free of dust, grease, oil or any other material which will prevent adhesion. Install after cleaning, painting and insulation is complete. Pipe identification shall comply with ANSI A13.1 for the "Scheme Identification of Piping Systems".
 2. Location and visibility for pipe identification:
 - a. On all horizontal runs spaced twenty feet (20') maximum but not less than once in each room at entrance and exit of each concealed space.
 - b. At each branch and riser takeoff.
 - c. Within one foot (1') of each valve and control device.
 - d. At every change in directional flow.
 - e. At every pipe passage through wall, floor and ceiling construction.

- f. Where capped piping is provided for future connections, provide legible and durable metal tags indicating symbol identification.
 - g. At all wall and ceiling access
 - h. Near major equipment items and other points of origination and termination.
 - i. Attention shall be given to visibility with reference to pipe markings. pipe lines are located above or below the normal line of vision; the lettering be placed below or above the horizontal centerline of the pipe.
3. ANSI Color Coding of Piping:

| SERVICE | COLOR OF FIELD | COLOR OF TEXT |
|---------------------------|----------------|---------------|
| Domestic Cold Water | Green | White |
| Domestic Hot Water | Yellow | Black |
| Domestic Hot Water Return | Yellow | Black |
| Sanitary Sewer | Green | White |
| Sanitary Vent | Green | White |

4. Size of Legend Letters:

| OUTSIDE DIAMETER OF PIPE COVERING | MINIMUM LENGTH OF COLOR FIELD | MINIMUM SIZE OF TEXT |
|-----------------------------------|-------------------------------|----------------------|
| ¾" to 1-1¼" | 8" | ½" |
| 1½" to 2" | 8" | ¾" |
| 2½" to 6" | 12" | 1¼" |
| 8" to 10" | 24" | 2½" |
| Over 10" | 32" | 3½" |

5. All exposed water piping and valves downstream of devices shall be properly identified and labeled as "Non-Potable" water.

B. Buried Utility Warning and Identification Tape:

1. All underground piping shall be identified with underground warning pipe markers as follows: Brady Perma-Code, MSI Marking Services Inc., or equal, non-adhesive four (4) mil polyethylene plastic tape manufactured specifically for warning and identification of buried utility lines. Tape shall be of the type provided in rolls, six inches (6") minimum width, color coded for the utility involved, with warning identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification for lines shall be "CAUTION (TYPE OF SERVICE) LINE BURIED BELOW". Code and letter coloring shall be permanent, unaffected by moisture and other substances contained in trench backfill material.
2. Run detector tape continuously along pipe and terminate in adjacent valve boxes or other suitable facilities. No splices will be allowed. Locate over buried pipe at twelve inches (12") below finish grade. Protect tape from damage during installation and Tape that is broken, cut or crumpled shall be completely replaced. Install twelve (12") above the top

of the respective pipe and twelve (12") below the surface during backfill. Provide detectable type for buried non-metallic pipes.

3. ANSI Color Code of underground tape shall be as follows:

| SERVICE | COLOR OF FILED | COLOR OF TEXT |
|----------------|-------------------|------------------|
| Natural Gas | Yellow | Black |
| Water | Blue | Black |
| Sanitary Sewer | Green | Black |
| Storm Sewer | Green | Black |
| Electric | Red | Black |

C. Valve Identification:

1. All valves shall have brass identification tag as follows: Brady Perma-Code, MSI Marking Services Inc., or equal, brass valve identification tag secured with brass chain and "S" hook. Tags shall bear the service identification and numerical identification of the valve.
2. Engrave identification tags with "normally open" (green) or "normally closed" (red).
3. Tags:
 - a. Minimum two inches (2") square pattern for plumbing and two inches (2") triangle for fire protection.
 - b. No. 18 BS gauge brass with stamped numbers and letters filled in with black enamel paint. Engraving, ink, dye and vinyl fill are not acceptable.
 - c. Identifying number and system letter. Top line shall be ¼" characters and should abbreviate the service. Example: Hot Water – HW. The second line shall be characters and should list the valve number. Example: 1st floor shall begin 101, second floor begin 201.
 - d. Attach 6"-12" of brass jack chain around bonnet or stem of the valve in a way that it cannot accidentally come off. Attach appropriate size brass "S" hook to the chain in the most conspicuous location. Hang valve tag from the "S" hook. Valve tag should not be attached to the wheel causing interference with valve operation.
 - e. Provide on: All valves and controls.
4. Where shut-off valves are installed on-branch line leading to emergency safety equipment (emergency showers and eyewashes), the valves shall be locked in the open position labeled for identification.

D. Equipment Identification:

1. Provide engraved plastic nameplates on all plumbing equipment, including but not limited to the following: Pumps (all types), water heaters, heat exchangers, and tanks. Provide nameplates on each piece of equipment and at the disconnect, and the breaker. Nameplates shall conform to the following, provided the equipment accommodate the sizes outlined:
 - a. Black background with white lettering.
 - b. Sizes: Equipment 2" x 4", disconnect 1" x 2½", breaker 1" x 3".
 - c. Lettering shall be ¾" (¼" minimum) or sized for the maximum per nameplate.
 - d. Nameplate shall be provided with both adhesive backing and screw holes to insure permanent application.

- e. Material shall be 2 ply 1/16" thick with beveled edges.
 2. Properly identify each piece of equipment and controls pertaining thereto by nameplates mounted on equipment and controls using round head brass machine screws, pop rivets or contact cement. Cardholders in any form not acceptable. Install with corrosion resistant mechanical fasteners and adhesive and seal with clear lacquer.
 3. Place warning signs on machines driven by electric motors which are controlled by fully automatic starters, in accordance with Article 3281, General Industry Safety Orders.
 4. Small devices, such as pumps, may be identified with tags.
 5. Identify control panels and major control components outside panels with nameplates.
 6. Identify equipment out of view behind access doors, in unfinished rooms on the face of the access door.
 7. All gas pressure regulators shall be identified with proper signs. The upstream pressure shall be identified with a metal tag permanently attached to the regulator and state (with appropriate wording to state actual gas pressure conditions): 5psig natural gas pressure. DO NOT REMOVE, or similar.
 8. Emergency Safety Equipment: Emergency units shall be with highly visible signs in accordance with ANSI 2358.1 and shall comply with the provisions of ANSI 2535.1 through ANSI 2535.5. Signs shall utilize a white background with green lettering. Graphics and lettering shall be of the correct size and format. Signs shall be furnished by manufacturer of the safety equipment and shall be in accordance with manufacturer's instructions and ANSI standards.
 9. At plumbing fixtures where water exceeding 120 degrees is accessible to users, warning signs with letters at least 2 inches high shall be posted above the fixture. Sign shall have "Danger Hot Water/Tap Symbol" in warning triangle and the words "Danger Hot Water, Use with Caution, Can Cause Severe Burns". Sign shall be approximately 12"high by 8" wide Semi-Rigid PVC and color shall be on White.
- E. Valve and Equipment Identification Charts:
- F. Provide five typewritten schedules giving numbers, service and locations, and notations of open or closed, of all tagged valves. Enclose each schedule in separate transparent plastic binder. List piping systems with symbol and color coding on pipe identification chart. List valve model numbers and symbol for service corresponding to piping symbol on valve identification chart. Provide small "key plan" identifying valves as related to column lines. Schematic flow diagrams of each piping system indicating:
1. Location and function of each tagged valve.
 2. Type, size and essential features of each system.
- G. Submit drafts of valve schedule for review before preparing final sets.
- H. Frame five copies of reviewed schedule under glass, mount where directed.
- I. Provide typewritten list of equipment in triplicate, indicating location, service for each piece of equipment, suitably framed, with glass front.

2.18 STRAINERS

- A. Wye type, with Monel or stainless steel strainer cylinder and gasketed machined strainer cap, bronze body, threaded, 250 pound, C.M. Bailey No. 100-B, or equal.

2.19 FLEXIBLE CONNECTORS

- A. All equipment, either rigidly mounted or mounted on vibration isolators, shall be attached to the piping system using flexible connectors designed for seismic movement. Flexible connectors shall be capable of movement in the $\pm X$, $\pm Y$ and $\pm Z$ planes and must completely isolate the equipment from the piping.
- B. Materials of construction and end fitting type shall be consistent with pipe material and equipment/ pipe connection fittings. For potable water service, connectors shall be classified in accordance with 61-1977 standards.
- C. Flexible connectors attached to fuel gas lines, shall be specifically manufactured for gas applications and certified by the American Gas Association.
- D. Flexible connectors shall be flexible corrugated hose and braid, stainless steel, rated, 125psig minimum, 150 lb flange for pipe sizes 2-1/2" and larger and threaded ends for 2" and smaller, as manufactured by The Company, or equal. Provide flexible metal hose assembly as shown on the drawings.

PART 3 - EXECUTION

3.1 DRAWINGS AND SITE

- A. Drawings:
 - 1. All scaled and figured dimensions are approximate and are given for estimate purposes only. Before proceeding with any work, carefully check and verify all dimensions, sizes, lengths, etc.
 - 2. So far as possible the work has been on the drawings in such positions as to suit and accommodate the work of the other trades, but the work as indicated is largely diagrammatic and is shown primarily for clarity. Contractor is responsible for the correct placing of their work and the proper location and connection of work in relation to the work of other trades.
 - 3. Where apparatus and equipment have been indicated on the drawings, dimensions have been taken from typical equipment of the class indicated. Carefully check the drawings to see that the equipment will fit into the spaces provided.
 - 4. Where equipment is furnished by others, verify dimensions and the correct locations of this equipment before proceeding with the roughing-in of connections.
 - 5. Contact Owner's Representative before any digging and investigate all existing conditions. Secure permit from Owner's Representative prior to initiation of underground excavation.

3.2 GENERAL PIPING INSTALLATION

- A. Carry all exposed and concealed horizontal lines of pipe on specified hangers properly spaced and set to allow the pipe to adjust for expansion and contraction. Use trapeze hangers for supporting groups of pipes. Piping in parallel shall be evenly spaced and supported.

- B. Conceal all piping in furred walls and partitions and pipe spaces except where specifically noted otherwise. Check all piping runs beforehand with all other trades. Run piping to maintain proper clearance for maintenance and to clear opening in exposed area. Run piping in strict coordination with mechanical piping, ducts, and equipment, plumbing work, all electrical conduit and equipment, structural, and architectural conditions. Where work of other trades prevents installation of the piping as shown on the Drawings, reroute piping at no extra cost. Verify all inverts in pitched lines before starting work.
- C. Install all exposed piping parallel to or at right angles with building walls and tight to walls or ceilings wherever possible, except where otherwise shown on the Drawings.
- D. No valve and no piece of equipment or trim shall support the weight of any pipe.
- E. Support all pipe from the building structure so that there is no apparent deflection in pipe runs. Fit piping with steel sway braces and anchors to prevent vibration and/or horizontal displacement under load when required. Do not support pipe from or brace to ducts, other pipes, conduit, or any materials shown on the Drawings. Piping or equipment be immobile and shall not be supported or hung by wire, rope, plumber's tape or blocking of any kind.
- F. Install all piping free from traps and air pockets and true to line and grade.
- G. Wherever changes in sizes of piping occur, make such changes with reducing fittings, as the use of face bushings will not, in general, be permitted. Install eccentric reducing fittings where necessary to provide free drainage of lines.
- H. Furnish and install insulating unions or insulating flanges as hereinbefore specified at all connections of ferrous and non-ferrous piping.
- I. Fire stop all pipes penetrating fire rated construction in accordance with specification Section 07 84 13, Fire Stopping and Smoke Seals.
- J. No cutting or drilling of structural members shall be done without prior written approval of structural engineer.
- K. Rough-In Work: Proceed as rapidly as the building construction will permit. All piping shall be completed, tested and approved before being enclosed.
- L. Thoroughly clean piping before installation. Cap all pipe openings to exclude dirt until fixtures are installed and final connections are made.
- M. Provide a drip at any point in the gas lines where condensate may collect. All drips shall be readily accessible to permit cleaning or emptying.
- N. Show no tool marks or threads on exposed plated, polished or enameled connections to fixtures.
- O. Provide each connection to faucet or fixture with an air chamber, eighteen inches (18") long, placed in a vertical position and one (1) pipe size larger than the pipe served.
- P. Pitch: Horizontal sanitary and storm drain piping shall be installed at a uniform grade of not less than one-fourth inch ($\frac{1}{4}$ ") per foot, unless otherwise indicated or directed.

- Q. Contraction and Expansion: Install all work in such a manner that its contraction and expansion will not do any damage to the pipes, the connected equipment, or the building. Install offsets, swing joints, expansion joints, seismic joints, anchors, etc., as required to prevent excessive strains in the pipe work. All supports shall be installed to permit the materials to contract and expand freely without putting any strain or stress on any part of the system. Provide anchors as necessary.
- R. Equipment and Fixtures Furnished under other Sections: For rough-ins and connections to fixtures and equipment furnished under other sections, ascertain exact sizes, services and locations before starting work. Verify accuracy of work shown on drawings before starting work. Contractor is responsible for providing proper installation. Provide proper prevention on all hot and cold water service.
- S. All piping shall be installed within designated finished and open ceiling heights as noted on the architectural drawings.
- T. Coordinate the installation of access panels with the equipment or valve being served. Valves and equipment located in ceiling spaces shall be accessible and located no more than 2'-0" above the access panel and within arm reach. Distances greater than 2'-0" only allowed when it is not possible to meet the 2'-0" requirement. Approval from the Owner's representative shall be obtained for such installations.
- U. Provide membrane clamping device for all piping drains and hose bibbs passing through any waterproof membrane.
- V. Powder actuated fastening systems will not be allowed. Embeds, beam clamps, or drilled fasteners will be required, unless otherwise noted. Earthquake bracing shall be required for all piping.
- W. All piping into stem walls and footings shall be double half lap wrapped with one-eighth inch (1/8") thick "Armaflex" insulation. The Contractor shall also provide blocked out areas in stem wall and footing as required for the installation of the piping. All piping shall avoid the lower eight inches (8") of the footing and the Contractor shall coordinate and provide dropped footings as required for the installation of the underground piping.
- X. All piping on roof shall be anchored to neoprene or close-cell polyethylene blocking with pipe straps. Blocking shall be set in mastic at 6'-0" on center.
- Y. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.
- Z. Provide pipe isolation for all piping through walls and floors. No piping shall have direct contact with walls, ceilings, floors, pipe supports, or hangers.

3.3 PIPE JOINTS

- A. Ream pipe ends to remove burrs, inspect each length of pipe carefully and remove all obstructions prior to fabrication.

- B. Screwed Piping: Cut with machine cutter, hand pipe cutter or carborundum pipe wheel with file or scrapper or pipe reamer. Do not ream to exceed I.D. of pipe and thread to ANSI B2.1 requirements. Use Teflon tape on male thread prior to joining other services. No more than two full threads shall remain exposed after joining. Teflon tape shall not be used on steam trap piping.
- C. Copper Tubing: Cut square; remove burrs and clean pipe and inside of fitting to a bright finish with steel wool, wire brush, sandpaper or emery cloth. Apply solder flux with brush to tubing. Remove internal parts of solder-end valves prior to soldering. Provide dielectric unions at points of connection of all copper tubing and any ferrous piping and equipment.
- D. Threaded Joints: Use threaded joints for natural gas pipes of size 2 inches and smaller. Where possible use pipe with factory-cut threads, otherwise cut pipe ends square, remove all fins and burrs, and cut taper pipe threads per ANSI B2.1. Threads shall be smooth, clean, and full-cut. Apply thread tape to male threads only. Work piping into place without springing or forcing. Backing off to permit alignment of threaded joints will not be permitted. Engage threads so that not more than two threads remain exposed. Use unions for connections to valves for which a means of disconnection is not otherwise provided.
- E. Welded Joints: Use welded joints for natural gas piping of sizes larger than two inches and all fuel oil piping. Weld by the shielded metal-arc process using covered electrodes and in accordance with procedures established and qualified per ANSI B31.2. Each welder and welding operator shall be qualified for the ANSI procedures as evidenced by a copy of a certified ANSI B31.2 qualification test report. Contractor shall conduct the ANSI qualification test.

3.4 PIPE SUPPORTS

- A. Maximum hanger spacing and rod sizes for horizontal runs of piping shall be as noted in Table 3-1 & Table 3-2 of the California Plumbing Code.
- B. Every branch of piping over three feet (3') long shall have a separate hanger. Support at each horizontal branch connection. Provide at least one (1) hanger per branch.
- C. Support all suspended piping with clevis or trapeze hangers and rods.
- D. Hangers and supports shall be adequate to maintain alignment and prevent sagging and shall be placed within eighteen-inches (18") of a joint. Support shall be provided at each horizontal branch connection. Hangers shall not be placed on joints. Make adequate provision to prevent shear or twisting of the pipe or joint.
- E. Support for cast iron no-hub pipes shall be adjacent to joint, not to exceed eighteen inches. Provide hangers on the piping at each side of and within eighteen inches (18") of a no-hub pipe coupling so that the coupling will not bear any weight. Provide supports at every other joint, unless over four feet (4') then support on each side of the coupling within eighteen inches (18") of the joint. Hangers shall not be placed on the coupling. Provide hangers adequate to maintain alignment and prevent sagging of the pipe. Make adequate provision to prevent shear or twisting of the pipe or joint.

3.5 CLEANOUTS

- A. Size: Cleanouts of same nominal size as pipe they serve, except where they occur in piping four inches (4") and larger, in which case they shall be four inches (4") in size.
- B. Accessibility: Make all cleanouts accessible. Use graphite on all cleanouts with all .threads being thoroughly greased after acceptable pressure test.
- C. Cleanouts Locations:
 - 1. Where indicated on drawings and as noted. Exact locations as directed by the Representative.
 - 2. At all horizontal offsets.
 - 3. At ends of or storm drain lines more than five feet (5') in length.
 - 4. At one-hundred feet (100') maximum intervals on all or drain horizontal runs within the building lines.
 - 5. At base of all soil/waste stacks and storm drain lines.
 - 6. For cleanouts in finished portions of building, locations subject to Owner Representative's approval before installation.
 - 7. Do not locate floor and wall in patient rooms, electrical rooms and elevator machine rooms.

3.6 ROOF OPENINGS

- A. Flash each pipe extending through roof with properly sized lead flashing assembly. Make watertight. Install vent caps on all vents through roof.

3.7 PLUMBING FIXTURES INSTALLATION

- A. Installation: Set Fixtures level and in proper alignment with respect to walls and floors, and sets of fixtures equally spaced. Install supplies in proper alignment with fixtures and with each other. Install flush valves in alignment with the fixture without vertical or horizontal offsets.
- B. Seals: Seal all wall and floor mounted fixtures watertight where fixture is in contact with wall or floors. Fill all cracks and open spaces between fixtures and wall or floor with non-elastomeric sealer. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 92 00, color to match fixture.
- C. Caulking: Caulk all deck mounted trim at the time of assembly, including fixture and casework mounted. Caulk all self-rimming sinks installed in casework.
- D. Trim: Make up trim with care and with the proper tools in order that no tool marks show after installation.
- E. Bolt carrier base supports to wall in accordance with manufacturer's installation instruction and recommendations.
- F. Water Closets and Urinals: Test and adjust all flush valves for water closets and urinals for proper flow. Bowls shall completely evacuate with a single flush. Splashing of water out of the bowl is not acceptable.

- G. Metered Faucets: Test and adjust all metered faucets for proper flow, duration of cycle.
- H. Extra Stock: Furnish special and other devices necessary for servicing plumbing fixtures and trim to Owner with receipt. Furnish one device for every ten (10) units.
- I. Installation of emergency safety equipment (emergency showers and eyewashes): Install emergency safety equipment in conformance with ANSI 2358.1-1998. Locate identification signs in accordance with this standard. Where shut-off valves are installed in the branch line leading to emergency safety equipment, the valves shall be indicating type (OS&Y or ball valve with lever handle), labeled for identification, and locked in the open position.

3.8 TESTING AND ADJUSTING

- A. Provide all equipment required for testing, including fittings for additional operating. Plumbing Inspector shall be present at time of testing.
- B. After the inspection has been approved or portions thereof, certify in writing the time, date, name and title of the person reviewing the test. This shall also include the description of what portion of the system has been approved.
- C. A complete record shall be maintained of all testing that has been approved, and shall be made available at the job site.
- D. Upon completion of the work, all records and certifications approving testing requirements shall be submitted to the Owner's Representative before final payment is made.
- E. Defective work or material shall be replaced or repaired, as necessary, and the inspection and test repeated. Repairs shall be made with new materials. No caulking of screwed joints or holes will be acceptable.
- F. Protection: Isolate all equipment subject to damage from test pressure. Make no test against a service valve or meter.
- G. No part of any work shall be concealed or covered until after it is inspected, tested and approved by the Inspector. All piping for plumbing shall be completely installed and tested as required by the Plumbing Code. The test pressures indicated are a minimum only. All tests shall be as required by the governing authority as well.
- H. Test all systems in accordance with the Uniform Plumbing Code and local authorities having jurisdiction. Unless local authorities have more stringent requirements, testing shall conform to the following:
 - 1. Domestic water system: 2016 California Plumbing Code Section 609.4.
 - 2. Sanitary sewer system: 2016 California Plumbing Code Section 712.2.
- I. Apply tests for a minimum period of four (4) hours or tests are complete.
- J. Work may be tested in sections, if necessary, for convenience. In this case, test of last section shall include connections between previously tested sections and section under test.

- K. Furnish all labor and all other utilities required to make tests. Make compliance tests in the presence of the Owner's Representative.
- L. Should any piece of equipment, apparatus, materials, or work fail in any of these tests, immediately remove and replace by perfect material, and retest the portion of the work replaced.

3.9 PIPE DISINFECTION AND CLEANING

- A. Supervision and Testing: Supervision and Testing: Perform disinfection under Plumbing Inspector's supervision. Disinfection shall be subject to written approval upon receipt of satisfactory laboratory test results.
- B. Contractor's Responsibility:
 - 1. Furnish labor, equipment, materials and transportation to disinfect domestic hot and cold water systems and fire lines directly connected thereto, in conformity with procedures and standards described herein.
 - 2. Disinfect domestic hot and cold water systems as required by the Public Health Department and all Authorities Having Jurisdiction.
 - 3. If no disinfection requirements are provided by the Authorities listed above, then disinfection shall conform to California Plumbing Code Sections 609.9.1 through 609.9.4.
- C. Preliminary Preparations:
 - 1. Service Cock: Provide within three feet (3') of the entrance of the supply main to the building, a three-fourths inch (¾") service cock, or valve, for introducing the disinfecting agent into the lines.
 - 2. Flushing: After final pressure tests and before draining for disinfection, open each fixture or outlet until the water flow is clear.
- D. Standards Necessary for Approval:
 - 1. The water system shall have been uniformly chlorinated under the supervision of Plumbing Inspector.
 - 2. The results of water sample analysis shall be negative for the Aerogenes organisms, with a coliform MPN of less than 2.2 and a total plate count of less than 100 bacteria per milliliter.
 - 3. If the test for the bacteriological quality of the water in the system does not meet the standards, repeat the disinfection procedure until the specified standards are met.
- E. Final Approval: Health Department will give written approval for acceptance and use of the water system after the above procedures have been successfully completed and the standards met.
- F. Temporary hook-ups shall be disinfected. All fittings and piping in temporary systems are to be disinfected.
- G. Upon completion of the work, all records and certifications approving pipe disinfections shall be submitted to the Owner's Representative before final payment is made.

3.10 PROTECTION, CARE AND CLEANING

- A. Provide adequate means for, and fully protect, all finished parts of the materials and equipment against physical damage from whatever cause during the progress of this work and until completion.
- B. During construction, properly cap all lines and equipment nozzles so as to prevent of sand, dirt, etc. Protect equipment against moisture, plaster, cement, paint or other work of other trades by covering it with polyethylene sheets.
- C. Thoroughly clean exterior and interior of piping, equipment, and materials before systems are put into operation. All systems of any nature shall be thoroughly cleaned and flushed of all pipe contaminants such as cuttings, filings, lubricant, rust, scale, grease, solder, flux, welding residue, debris, etc. Any piece of equipment or part of any system which malfunctions or is damaged due to failure or neglect on the of this Division to observe this paragraph shall be repaired or replaced to the satisfaction of the Owner's by and at the total expense of this Contract.
- D. After completed installation, clean all systems.
 - 1. Piping, and Equipment, Non-insulated or to be insulated: Clean exterior thoroughly to remove most, plaster, cement, and dirt before insulation is applied.
 - 2. Piping and Equipment to Be Painted: Clean exterior of piping, and equipment, exposed in completed structure, removing rust, plaster, cement and dirt by wire brushing. Remove grease, oil, and similar materials by wiping with clean rags and suitable non-toxic solvents. Touch up primer coat as required.
 - 3. Motors, Pumps and Other Items with Factory Finish: Remove grease and oil, and leave surfaces clean and polished.
 - 4. Plumbing Fixtures: Clean and polish fixtures immediately prior to final inspection of Owner Representative's occupancy. Clean floor drain grates, faucet aerators and outlets, check each fixture to insure against trap stoppage.
 - 5. Chrome or Nickel Plated Work: Thoroughly polish.
 - 6. Factory Finished Items: Remove grease and oil and leave surfaces clean and polished.
- E. All code stamps and nameplates shall be protected from damage and must be clean and legible before final inspection.
- F. All piping shall be flushed out or blown out after pressure testing is complete and before being put into use. All strainer screens shall be removed and cleaned.
- G. After start-up and testing, strainer screens shall again be removed and cleaned.

3.11 PAINTING AND IDENTIFICATION

- A. After completion of hydrostatic tests, all system piping exposed to view in or on the building shall be painted in accordance with Section 09 91 00-Painting.
- B. Provide pipe, valve, and equipment identification, and signage in accordance with referenced standards, codes and specifications.

3.12 ACCESSIBILITY OF EQUIPMENT

- A. The installation of valves, thermometers, gages, traps, cleanouts, control devices or other specialties requiring reading, adjustment, inspection, repairs, removal or replacement shall be conveniently and accessibly located with reference to the finished building.

3.13 CLOSING IN OF UNINSPECTED WORK

- A. Do not allow or cause any to be covered up or enclosed until inspected, tested and approved.

3.14 EMERGENCY REPAIRS

- A. The Owner reserves the right to make temporary repairs as necessary to keep equipment in operating condition without voiding the guarantee bond or relieving the Contractor of their responsibility during the bonding period.

3.15 CLEAN UP AND REMOVAL OF SCRAP

- A. For work under all Mechanical Sections, trash and scrap shall be cleaned up and removed from the site as the work progresses.

3.16 PRELIMINARY OPERATIONS

- A. The Owner reserves the right to operate portions of the mechanical system on a preliminary basis without voiding the guarantee.

3.17 EXCAVATION AND TRENCHING: (As required for this section)

- A. Trenches for underground piping shall have uniform grades same as for pipe. Pipe shall be embedded in six inches (6") minimum layer of clean sand all around.
- B. Loose earth shall be tamped solid around sides and on top of sand-covered pipe and remainder thoroughly compacted to prevent settlement of the surface. After completion of backfill, the grade shall be finished to match the existing, or as directed. All paving and walkways shall be finished to match the existing.
- C. Provide and maintain dewatering pumps as required. After piping installation, it shall be inspected and approved by the Owner's Representative before Backfill shall not be placed on or around piping for twenty-four (24) hours after pipe joints have been made and before lines are properly tested and approved.
- D. Provide barricades, signs, lanterns, shoring, sheeting and pumping as part of Work in this Division as required to insure safe conditions. Provide shoring and cross bracing of sufficient strength to properly support the walls of all excavations at depth of four feet (4') or more as required to protect personnel, and as required by OSHA.
- E. Minimum bury for piping exterior to the building shall be thirty-six inches (36") minimum cover from top of pipe to finished grade except as otherwise shown, or as determined by invert

elevations. Contractor shall verify all piping elevations, and invert elevations before starting work.

- F. Excavation and pipe installation on public property shall be fully coordinated for timing and procedures with the authorities having jurisdiction. Work shall to all local Public Work rules and regulations. All paved areas and concrete sidewalks damaged during this work shall be repaired to match existing when new to the satisfaction of the governing authorities.
- G. Dispose of all surplus excavation material and seepage water as directed by general contractor and in accordance with local codes and applicable laws.
- H. Trees: When it is necessary to excavate adjacent to existing trees, the Contractor shall use all possible care to avoid injury to trees and roots. Where a ditching machine is run close to trees having roots smaller than two inches (2") in diameter, the wall of the trench adjacent to the trees shall be hand trimmed making clean cuts through the roots. All cuts through roots one-half inch and larger in diameter shall be painted with "Tree-Seal", or equal. Trenches adjacent to trees should be filled within twenty-four (24) hours after excavation, but where this is not possible, the side of the trench adjacent to the tree shall be kept shaded with burlap or canvas. Stockpiling of earth or building materials within the drip line of trees is prohibited. Where any roots two inches (2") and larger are encountered, the Contractor shall hand tunnel under root and protect it by burlap wrapping.
- I. Water piping shall not be run in the same trench with sewer or drainage piping unless separated as required by the plumbing code.
- J. Pitch: Horizontal sanitary and storm drain piping shall be installed at a uniform grade of not less than one-fourth inch per foot, unless otherwise indicated or directed.

3.18 BACKFILL

- A. Trenches: Do not place backfill in trenches until pipe installation has been reviewed and accepted by the Owner's Representative.
- B. Within twenty-four (24) hours or as soon as pipe has been laid and inspected, place in layers to the elevation at which excavation was begun, or to a height of six inches (6") from rocks or lumps greater than four inches (4") in any dimensions. Place in six-inch (6") layers and bring up evenly and tamp continually on both sides of pipe. Use excavated materials or other approved materials as directed. Tamp by hand or with pneumatic tampers. Machine tamping and compaction by flooding or puddling will not be accepted.
- C. Compaction: Relative compaction of backfilling for pipe trenches and concrete structures shall be not less than 90 percent in accordance with Test Method No. Calif. 216 and ASTM D1557-58T. Fills below structures and the upper eighteen inches (18") of sub-grade beneath areas to be paved shall be compacted to 95%.
- D. Settling: which subsides or settles below finish grades or adjacent ground during warranty period shall be removed to top pipe and replaced with compacted fill as specified.

3.19 GUARANTEE

- A. At completion, furnish the Owner's Representative a written guarantee, in triplicate, that work has been performed in accordance with Drawings and Specifications and to replace or repair, to the satisfaction of the Owner's Representative any portion of the work that fails within the guarantee period after final acceptance provided such failure is due to Also agree to replace or repair, with like any part of the building or equipment installed by other trades but damaged by them in installing their work.
- B. During the guarantee period, make four (4) inspections of the work at six (6)-month intervals after final acceptance to check the performance of systems and correct any guaranteed items. Inspections to be made in the presence of the Owner's Representative.
- C. Guarantee in writing all plumbing work for a period of twenty-four (24) months following date of certificate of final acceptance.
- D. All apparatus shall be built and installed to deliver its full rated capacity at the efficiency for which it was designed.
- E. All plumbing and electrical apparatus shall operate at full capacity without objectionable noise or vibration.
- F. The plumbing systems shall provide the performance required at standard operating conditions.
- G. Where a manufacturer's guarantee exceeds one (1) year, the longer guarantee/warranty shall govern.

3.20 TRAINING

- A. Submit a written test schedule to the Owner's Representative for approval a minimum of three (3) weeks prior to proposed training dates.
- B. Provide three (3) sessions of two (2) hours each of instruction to the Owner regarding proper use and operation of the system. Submit a written course outline and a sample of all manuals to be used two (2) weeks prior to the scheduling of the training. Training shall include both classroom and "hands-on" sessions and shall occur after final inspection and testing. Location and timing of the training session is to be arranged with the Owner's Representative.
- C. Two weeks prior to scheduled training dates, furnish the Owner's Representative with six (6) bound copies of complete instructions, including catalog cuts, diagrams, drawings, and other descriptive data covering the proper testing, and maintenance of each type of system installed, and the necessary information for ordering replacement parts. In addition, post one (1) copy of complete instructions at the control panel location.
- D. Session shall include detailed training and instructions covering the necessary and recommended testing, operating, and maintenance procedures for each type of system. Session shall include training and instructions covering the emergency operation procedures for type of system.
- E. Session shall include training and instructions covering the emergency operation procedures for each type of system.

END OF SECTION

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 -

PART 2 - PART 1 - GENERAL**2.1 SUMMARY**

- A. This Section includes the following:
 - 1. Electrical identification.
 - 2. Utility company electricity-metering components.
 - 3. Concrete equipment bases.
 - 4. Electrical demolition.
 - 5. Cutting and patching for electrical construction.
- B. Refer to drawings for applicable codes.
- C. Refer to Division 11 and Division 13 specifications for additional electrical work to be provided.
- D. Refer to TR, TL, AV and FS drawings for additional electrical work to be provided.

2.2 SUBMITTALS

- A. Product Data: For utility company electricity-metering components.
- B. Shop Drawings: Dimensioned plans and sections or elevation layouts and single-line diagram of electricity-metering component assemblies specific to this Project.

2.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Devices for Utility Company Electricity Metering: Comply with utility company published standards.
- C. Comply with NFPA 70.

2.4 COORDINATION

- A. Coordinate chases, slots, inserts, sleeves, and openings for electrical supports, raceways, and cable with general construction work.
- B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment that requires positioning before closing in the building.

BASIC ELECTRICAL MATERIALS AND METHODS

- C. Coordinate electrical service connections to components furnished by utility companies.
 - 1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for service entrances and electricity-metering components.
- D.
- E. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces.
- F. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

G.

PART 3 - PRODUCTS

3.1 SUPPORTING DEVICES

- A. Material: Cold-formed steel, with corrosion-resistant coating.
- B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.
- C. Slotted-Steel Channel: Flange edges turned toward web, and 9/16-inch- diameter slotted holes at a maximum of 2 inches o.c., in webs. Strength rating to suit structural loading.
- D. Slotted Channel Fittings and Accessories: Recommended by the manufacturer for use with the type and size of channel with which used.
 - 1. Materials: Same as channels and angles, except metal items may be stainless steel.
- E. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.
- F. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.
- G. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for nonarmored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.
- H. Expansion Anchors: Carbon-steel wedge or sleeve type.
- I. Toggle Bolts: All-steel springhead type.
- J. Powder-Driven Threaded Studs: Heat-treated steel.

3.2 ELECTRICAL IDENTIFICATION

- A. Identification Device Colors: Use those prescribed by ANSI A13.1, NFPA 70, and these Specifications.

BASIC ELECTRICAL MATERIALS AND METHODS

- B. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape, not less than 1 inch wide by 3 mils thick.
- C. Tape Markers for Conductors: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
- D. Color-Coding Cable Ties: Type 6/6 nylon, self-locking type. Colors to suit coding scheme.
- E. Underground Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape compounded for permanent direct-burial service, and with the following features:
 - 1. Not less than 6 inches wide by 4 mils thick.
 - 2. Embedded continuous metallic strip or core.
 - 3. Printed legend that indicates type of underground line.
- F. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch minimum thickness for signs up to 20 sq. in. and 1/8-inch minimum thickness for larger sizes. Engraved legend in black letters on white background.
- G. Warning and Caution Signs: Preprinted; comply with 29 CFR 1910.145, Chapter XVII. Colors, legend, and size appropriate to each application.
 - 1. Interior Units: Aluminum, baked-enamel-finish, punched or drilled for mechanical fasteners.
 - 2. Exterior Units: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate with 0.0396-inch, galvanized-steel backing. 1/4-inch grommets in corners for mounting.
- H. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

3.3 EQUIPMENT FOR UTILITY COMPANY'S ELECTRICITY METERING

- A. Comply with requirements of electrical power utility company for all new service entrance equipment, raceways and structures.

3.4 CONCRETE BASES

- A. Concrete Forms and Reinforcement Materials: As specified in Division 3 Section "Cast-in-Place Concrete."
- B. Concrete: 3000-psi, 28-day compressive strength.
- C.

PART 4 - EXECUTION

4.1 ELECTRICAL EQUIPMENT INSTALLATION

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom.

- B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Right of Way: Give to raceways and piping systems installed at a required slope.

4.2 ELECTRICAL SUPPORTING DEVICE APPLICATION

- A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, slotted channel system components.
- B. Dry Locations: Steel materials.
- C. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four with, 200-lb minimum design load for each support element.

4.3 SUPPORT INSTALLATION

- A. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
- B. Size supports for multiple raceway or cable runs so capacity can be increased by a 25 percent minimum in the future.
- C. Support individual horizontal single raceways with separate, malleable-iron pipe hangers or clamps except use spring-steel fasteners for 1-1/2-inch and smaller single raceways above suspended ceilings and for fastening raceways to slotted channel and angle supports.
- D. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.
- E. Secure electrical items and their supports to building structure, using the following methods unless other fastening methods are indicated:
 - 1. Wood: Wood screws or screw-type nails.
 - 2. Gypsum Board: Toggle bolts. Seal around sleeves with joint compound, both sides of wall.
 - 3. Masonry: Toggle bolts on hollow block and expansion bolts on solid block. Seal around sleeves with mortar, both sides of wall.
 - 4. New Concrete: Concrete inserts with machine screws and bolts.
 - 5. Existing Concrete: Expansion bolts.
 - 6. Structural Steel: Spring-tension clamps.
 - a. Comply with AWS D1.1 for field welding.
 - 7. Light Steel Framing: Sheet metal screws.
 - 8. Fasteners for Damp, Wet, or Weather-Exposed Locations: Stainless steel.
 - 9. Light Steel: Sheet-metal screws.

10. Fasteners: Select so load applied to each fastener does not exceed 25 percent of its proof-test load.

4.4 IDENTIFICATION MATERIALS AND DEVICES

- A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.
- C. Self-Adhesive Identification Products: Clean surfaces before applying.
- D. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.
- E. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches, overall, use a single line marker.
- F. Install warning, caution, and instruction signs where required to comply with 29 CFR 1910.145, Chapter XVII, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Indoors install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.
- G. Install engraved-laminated emergency-operating signs with white letters on red background with minimum 3/8-inch- high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

4.5 ELECTRICITY-METERING EQUIPMENT

- A. Install utility company metering equipment according to utility company's written requirements. Provide grounding and empty conduits as required by utility company.

4.6 FIRESTOPPING

- A. Apply firestopping to cable and raceway sleeves and other penetrations of fire-rated floor and wall assemblies to restore original undisturbed fire-resistance ratings of assemblies. Firestopping installation is specified in Division 7 Section "Through-Penetration Firestop Systems."

4.7 CONCRETE BASES

BASIC ELECTRICAL MATERIALS AND METHODS

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated.

4.8 DEMOLITION

- A. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.
- B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.
- C. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.
- D. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

4.9 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair, refinish and touch up disturbed finish materials and other surfaces to match adjacent undisturbed surfaces.

END OF SECTION

SECTION 26 05 13
CONDUCTORS AND CABLES**PART 1 - GENERAL****1.1 SUMMARY**

- A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.2 SUBMITTALS

- A. Field quality-control test reports.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 CONDUCTORS AND CABLES

- A. Manufacturers:
 - 1. American Insulated Wire Corp.; a Leviton Company.
 - 2. General Cable Corporation.
 - 3. Senator Wire & Cable Company.
 - 4. Southwire Company.
- B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.
- C. Conductor Material: Copper complying with NEMA WC 5 or 7; solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger.
- D. Conductor Insulation Types: Type THW, THHN-THWN or XHHW complying with NEMA WC 5 or 7

2.3 CONNECTORS AND SPLICES

A. Manufacturers:

1. AFC Cable Systems, Inc.
2. AMP Incorporated/Tyco International.
3. Hubbell/Anderson.
4. O-Z/Gedney; EGS Electrical Group LLC.
5. 3M Company; Electrical Products Division.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR AND INSULATION APPLICATIONS

- A. Service Entrance: Type THHN-THWN, single conductors in raceway.
- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspace: Type THHN-THWN, single conductors in raceway.
- E. Exposed Branch Circuits, including in Crawlspace: Type THHN-THWN, single conductors in raceway .
- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- G. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THHN-THWN, single conductors in raceway.
- H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord.
- I. Fire Alarm Circuits: Type THHN-THWN, in raceway.
- J. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- K. Class 2 Control Circuits: Type THHN-THWN, in raceway.

3.2 INSTALLATION

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 16 Section "Basic Electrical Materials and Methods."
- F. Seal around cables penetrating fire-rated elements according to Division 7 Section "Through-Penetration Firestop Systems."
- G. Identify and color-code conductors and cables according to Division 16 Section "Basic Electrical Materials and Methods."
- H. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- I. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.3 FIELD QUALITY CONTROL

- A. Testing: Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.
- B. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION

SECTION 26 05 33**RACEWAYS AND BOXES****PART 1 - GENERAL****1.1 SUMMARY**

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.2 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets indicated.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 METAL CONDUIT AND TUBING

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc.
 - 2. Alflec Inc.
 - 3. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 4. Electri-Flex Co.
 - 5. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
 - 6. LTV Steel Tubular Products Company.
 - 7. Manhattan/CDT/Cole-Flex.
 - 8. O-Z Gedney; Unit of General Signal.
 - 9. Wheatland Tube Co.
- B. Rigid Steel Conduit: ANSI C80.1.

- C. IMC: ANSI C80.6.
- D. EMT and Fittings: ANSI C80.3.
 - 1. Fittings: Set-screw or compression type.
- E. FMC: Aluminum.
- F. LFMC: Flexible steel conduit with PVC jacket.
- G. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

2.3 NONMETALLIC CONDUIT AND TUBING

- A. Manufacturers:
 - 1. American International.
 - 2. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 3. Arnco Corp.
 - 4. Cantex Inc.
 - 5. Certainteed Corp.; Pipe & Plastics Group.
 - 6. Condux International.
 - 7. ElecSYS, Inc.
 - 8. Electri-Flex Co.
 - 9. Lamson & Sessions; Carlon Electrical Products.
 - 10. Manhattan/CDT/Cole-Flex.
 - 11. RACO; Division of Hubbell, Inc.
 - 12. Spiraldut, Inc./AFC Cable Systems, Inc.
 - 13. Thomas & Betts Corporation.
- B. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.
- C. RNC Fittings: NEMA TC 3; match to conduit or tubing type and material.

2.4 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Finish with manufacturer's standard prime coating.
 - 1. Manufacturers:
 - a. Airey-Thompson Sentinel Lighting; Wiremold Company (The).
 - b. Thomas & Betts Corporation.
 - c. Walker Systems, Inc.; Wiremold Company (The).
 - d. Wiremold Company (The); Electrical Sales Division.
- B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC compound with matte texture and manufacturer's standard color.
 - 1. Manufacturers:
 - a. Butler Manufacturing Co.; Walker Division.
 - b. Enduro Composite Systems.
 - c. Hubbell, Inc.; Wiring Device Division.

- d. Lamson & Sessions; Carlon Electrical Products.
- e. Panduit Corp.
- f. Walker Systems, Inc.; Wiremold Company (The).
- g. Wiremold Company (The); Electrical Sales Division.

- C. Types, sizes, and channels as indicated and required for each application, with fittings that match and mate with raceways.

2.5 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers:
 - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 - 2. Emerson/General Signal; Appleton Electric Company.
 - 3. Erickson Electrical Equipment Co.
 - 4. Hoffman.
 - 5. Hubbell, Inc.; Killark Electric Manufacturing Co.
 - 6. O-Z/Gedney; Unit of General Signal.
 - 7. RACO; Division of Hubbell, Inc.
 - 8. Robroy Industries, Inc.; Enclosure Division.
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.
- D. Nonmetallic Outlet and Device Boxes: NEMA OS 2.
- E. Floor Boxes: Cast metal, fully adjustable, rectangular.
- F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- G. Cast-Metal Pull and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.
- H. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
- I. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.

2.6 FACTORY FINISHES

- A. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard prime-coat finish ready for field painting.

2.7 CABLE TRAY

- A. Cable tray shall be aluminum, rung type, 24"W x 4"H, with rung spacing of 6", per NEMA VE 1 requirements.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors:
 - 1. Exposed: Rigid steel or IMC.
 - 2. Concealed: Rigid steel or IMC.
 - 3. Underground, Single Run: RNC.
 - 4. Underground, Grouped: RNC.
 - 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 - 6. Boxes and Enclosures: NEMA 250, Type 3R.
- B. Indoors:
 - 1. Exposed: EMT.
 - 2. Concealed: EMT.
 - 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except use LFMC in damp or wet locations.
 - 4. Damp or Wet Locations: Rigid steel conduit.
 - 5. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
 - a. Damp or Wet Locations: NEMA 250, Type 4, stainless steel.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Conduits used for fiber optic cable installation shall be provided with inner duct.
- E. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.2

- 1. PVC Externally Coated, Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.

3.3 INSTALLATION

- A. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- B. Complete raceway installation before starting conductor installation.
- C. Support raceways as specified in Division 16 Section "Basic Electrical Materials and Methods."
- D. Install temporary closures to prevent foreign matter from entering raceways.

- E. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above finished slab.
- F. Provide inner duct in conduit for all fiber optic cable installation.
- G. Provide flexible metal conduits for conduits installed inside cabinets.
- H. Make bends and offsets so ID is not reduced. Keep legs of bends in same plane and keep straight legs of offsets parallel, unless otherwise indicated.
- I. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
 - 1. Install concealed raceways with a minimum of bends in shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.
- J. Raceways Embedded in Slabs: Install in middle 1/3 of slab thickness where practical and leave at least 2 inches of concrete cover.
 - 1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
 - 2. Space raceways laterally to prevent voids in concrete.
 - 3. Run conduit larger than 1-inch trade size parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 - 4. Change from nonmetallic tubing to Schedule 80 nonmetallic conduit, rigid steel conduit, or IMC before rising above floor.
- K. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.
 - 1. Run parallel or banked raceways together on common supports.
 - 2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
- L. Join raceways with fittings designed and approved for that purpose and make joints tight.
 - 1. Use insulating bushings to protect conductors on all raceways 2" and larger.
- M. Tighten set screws of threadless fittings with suitable tools.
- N. Terminations:
 - 1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
 - 2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.
- O. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- P. Telephone and Signal System Raceways, 2-Inch Trade Size and Smaller: In addition to above requirements, install raceways in maximum lengths of 150 feet and with a maximum of two 90-

degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.

- Q. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where otherwise required by NFPA 70.
- R. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.
- S. Flexible Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.
- T. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.
- U. Set floor boxes level and flush with finished floor surface.
- V. Install hinged-cover enclosures and cabinets plumb. Support at each corner.
- W. Install cable tray in accordance with NEMA VE 2 requirements.

3.4 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 26 51 00
INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide new direct/indirect lighting with average of 50 foot-candles horizontal and minimum of 5 foot-candles vertical.

1.2 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with
1. CEC California Electric Code
 2. UL
 - a. UL 875 Light Emitting Diode (LED) Lighting Sources for Use in Lighting
 - b. UL 1598 Luminaires
 - c. UL 1012 Power Units Other Than Class 2
 - d. UL 1310 Class 2 Power Units
 - e. UL 2108 Low Voltage Lighting Systems
 3. ANSI
 - a. C78.377.2008 Specifications for the Chromaticity of Solid State Lighting Products
 4. IESNA
 - a. LM 79-80 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products.
 - b. LM 80-08 Approved Method for lumen Maintenance Testing of LED Light Sources
 - c. TM 20-11 Projecting Long Term Lumen Maintenance of LED Light Sources
- C. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

PART 2 -

PART 3 - 1.3 SUBMITTALSPART 4 - A. Manufacturer's Product Data:PART 5 - 1. List of Materials: For each item, Include:PART 6 - a) ManufacturerPART 7 - b) Model numberPART 8 - c) Listing: UL, City Lab or nonePART 9 - d) QuantityPART 10 - 2. Manufacturer's Product Data: In sequence of List of Materials, DataPART 11 - sheet for each item, including all accessories, marked for proposed product.

PART 12 -

A. PART 2 - PRODUCTS

12.2 2.1 MANUFACTURERS

- A. A. In other Part 2 articles where titles below introduce lists, the following shall apply:
1. Products: Subject to compliance with requirements, provide one of the products specified.

12.3 2.2 FIXTURES AND COMPONENTS, GENERAL

- A. A. Air-Handling Fixtures: For use with plenum ceiling for air return and supply.
1. Air Supply Units: Slots in one or both side trims join with air-diffuser-boot assemblies.
 2. Heat Removal Units: Air path leads through lamp cavity.
 3. Combination Heat Removal and Air Supply Unit: Heat is removed through lamp cavity at both ends of the fixture door with air supply same as for air supply units.
 4. Dampers: Operable from outside fixture for control of return-air volume.
 5. Static Fixtures: Air supply slots are blanked off, and fixture appearance matches active units.

12.4 2.3 LIGHTING FIXTURES

- A. A. Fixture: Energy efficient volumetric type meeting Title 24 and Disposal requirements.

12.5 2.4 EXIT SIGNS

- A. A. General: Comply with UL 924; for sign colors and lettering size, comply with applicable code.
- B. Internally Lighted Signs:
1. Lamps for AC Operation: Light-emitting diodes with 25 years warranty..
- C. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
1. Battery: Sealed, maintenance-free, nickel-cadmium type with special warranty.
 2. Charger: Fully automatic, solid-state type with sealed transfer relay.
 3. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.

12.6 2.5 EMERGENCY LIGHTING UNITS

- A. A. General: Self-contained units complying with UL 924.
1. Battery: Sealed, maintenance-free, lead-acid type with minimum 10-year nominal life and special warranty.
 2. Charger: Fully automatic, solid-state type with sealed transfer relay.

3. Operation: Relay automatically turns lamp on when power supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
4. Wire Guard: Where indicated, heavy-chrome-plated wire guard protects lamp heads or fixtures.
5. Integral Time-Delay Relay: Holds unit on for fixed interval when power is restored after an outage; time delay permits high-intensity-discharge lamps to restrike and develop adequate output.

12.7 2.6 LED LIGHTING

A.

A. Correlated color temperature (CCT): 3500 °K.

B. Color rendering index (CRI): 75 minimum.

C. Off-state power consumption: The power draw of the luminaire (including PE or remote monitoring unit) shall not exceed 2.50 watts when in the off state.

D. Operating environment: Luminaire shall be able to operate normally in temperatures from -20° C to 50° C.

E. Cooling system: Shall consist of a heat sink with no fans, pumps, or liquids, and shall be resistant to debris buildup that does not degrade heat dissipation performance.

F. Lumen depreciation: LED module(s)/array(s) shall deliver at least 70% of initial lumens, when installed for a minimum of 100,000 hours.

G. Lighting Distribution: Per lighting fixture schedule and in accordance with IESNA Lighting Distributions.

H. Maximum amperage at LED: Maximum amperage at LED shall not exceed driver current to meet lumen depreciation value described above but shall not exceed 700 mA per mm² of chip. Multi-current (dimming) driver output shall be within the limits described in this Section. Provision only for dimming function controllable via networked control system.

I. The Driver and LED arrays shall be designed for multi-current input operation, with adjustable ratings at 350 mA, 525 mA and 700 mA.

J. Transient protection: Per IEEE C.62.41-1991, Class A operation. The line transient shall consist of seven strikes of a 100k HZ ring wave, Min. 10kV level, for both common mode and differential mode.

K. Operating temperature: Power supply shall operate between -20° C and 50° C.

L. Frequency: Output operating frequency must be ≥ 120 Hz (to avoid visible flicker) and input operating frequency of 60 Hz.

M. Interference: Power supplies shall meet FCC 47 CFR Part 15/18 (Consumer Emission Limits).

N. Noise: Power supply shall have a Class A sound rating per ANSI Standard C63.4.

O. Fixture Warranty: Manufacturer shall warranty to replace defective light fixtures or parts thereof for a period of 5 years.

12.8 2.10 FIXTURE SUPPORT COMPONENTS

- A. A. Comply with Division 26 Section "Basic Electrical Materials and Methods."
- B. Single-Stem Hangers: 1/2-inch.
- C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
- D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated, 12 gage.
- E. Wires For Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage.
- F. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- G. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

12.9 2.11 LIGHTING CONTROL DEVICES

- A. A. Dimming Driver Controls: Sliding-handle type with on/off control.
- B. Light Level Sensor: Detect changes in ambient lighting level and provide dimming range of 20 to 100 percent in response to change.
 - 1. Sensor Capacity: At least 40 electronic dimming driver.
 - 2. Adjustable Ambient Detection Range: 10 to 100 fc minimum
- C. Occupancy Sensors: Adjustable sensitivity and off delay time range of 5 to 15 minutes.
 - 1. Device Color:
 - a. Wall Mounted: White.
 - b. Ceiling Mounted: White.
 - 2. Occupancy detection indicator.
 - 3. Ultrasonic Sensors: Crystal controlled with circuitry that causes no detection interference between adjacent sensors.

4. Infrared Sensors: With daylight filter and lens to afford coverage applicable to space to be controlled.
5. Combination Sensors: Ultrasonic and infrared sensors combined.
- 6.
7. PART 3 - EXECUTION

12.10 3.1 INSTALLATION

- A. A. Fixtures: Set level, plumb, and square with ceilings and walls. Ins
- B. B.Support for Fixtures in or on Grid-Type Suspended Ceilings: Provide both grid and additional wire supports. Refer to DSA IR 25-2/1.11 for requirements.
 1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches from fixture corners.
 2. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
 4. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.
- C. C. Suspended Fixture Support: As follows:
 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
 3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
 4. Continuous Rows: Suspend from cable.
- D. Air-Handling Fixtures: Install with dampers closed and ready for adjustment.
- E. Adjust aimable fixtures to provide required light intensities.

END OF SECTION

SECTION 26 27 26**WIRING DEVICES****PART 1 - GENERAL****1.1 SUMMARY**

- A. This Section includes the following:
 - 1. Single and duplex receptacles, ground-fault circuit interrupters.
 - 2. Single- and double-pole snap switches and dimmer switches.
 - 3. Device wall plates.
 - 4. Floor service outlets, poke-through assemblies and multioutlet assemblies.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Wiring Devices:
 - a. Bryant Electric, Inc./Hubbell Subsidiary.
 - b. Eagle Electric Manufacturing Co., Inc.
 - c. Hubbell Incorporated; Wiring Device-Kellems.
 - d. Leviton Mfg. Company Inc.
 - e. Pass & Seymour/Legrand; Wiring Devices Div.

2. Multioutlet Assemblies:
 - a. Hubbell Incorporated; Wiring Device-Kellems.
 - b. Wiremold Company (The).
3. Poke-Through, Floor Service Outlets and Telephone/Power Poles:
 - a. Hubbell Incorporated; Wiring Device-Kellems.
 - b. Pass & Seymour/Legrand; Wiring Devices Div.
 - c. Square D/Groupe Schneider NA.
 - d. Thomas & Betts Corporation.
 - e. Wiremold Company (The).

2.2 RECEPTACLES

- A. Straight-Blade-Type Receptacles: Comply with NEMA WD 1, NEMA WD 6, DSCC W-C-596G, and UL 498.
- B. Straight-Blade and Locking Receptacles: Heavy-Duty grade.
- C. Straight-Blade Receptacles: Hospital grade.
- D. GFCI Receptacles: Straight blade, non-feed-through type, Hospital or Heavy-Duty grade, with integral NEMA WD 6, Configuration 5-20R duplex receptacle; complying with UL 498 and UL 943. Design units for installation in a 2-3/4-inch- deep outlet box without an adapter.

2.3 SWITCHES

- A. Single- and Double-Pole Switches: Comply with DSCC W-C-896F and UL 20.
- B. Snap Switches: Heavy-Duty grade, quiet type.
- C. Combination Switch and Receptacle: Both devices in a single gang unit with plaster ears and removable tab connector that permit separate or common feed connection.
 1. Switch: 20 A, 120/277-V ac.
 2. Receptacle: NEMA WD 6, Configuration 5-15R.
- D. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and audible frequency and EMI/RFI filters.
 1. Control: Continuously adjustable slider; with single-pole or three-way switching to suit connections.
 2. Incandescent Lamp Dimmers: Modular, 120 V, 60 Hz with continuously adjustable rotary knob, toggle switch, or slider; single pole with soft tap or other quiet switch; EMI/RFI filter to eliminate interference; and 5-inch wire connecting leads.

3. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.4 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.
 1. Plate-Securing Screws: Metal with head color to match plate finish.
 2. Material for Finished Spaces:
 - a. Steel with white baked enamel, suitable for field painting
 - b. 0.035-inch- thick, satin-finished stainless steel (above counters and in restrooms)
 3. Material for Unfinished Spaces: Galvanized steel.
 4. Material for Wet Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."

2.5 FLOOR SERVICE FITTINGS

- A. Type: Modular, flush-type , dual-service units suitable for wiring method used.
- B. Compartments: Barrier separates power from voice and data communication cabling.
- C. Service Plate: Rectangular, solid brass with satin finish.
- D. Power Receptacle: NEMA WD 6, Configuration 5-15R, gray finish, unless otherwise indicated.
- E. Voice and Data Communication Outlet: See telecommunication specifications for requirements.

2.6 POKE-THROUGH ASSEMBLIES

- A. Description: Factory-fabricated and -wired assembly of below-floor junction box with multichanneled, through-floor raceway/firestop unit and detachable matching floor service outlet assembly.
 1. Service Outlet Assembly: Flush type with two simplex receptacles and space for two RJ-45 jacks.
 2. Size: Selected to fit nominal 4-inch cored holes in floor and matched to floor thickness.
 3. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.
 4. Closure Plug: Arranged to close unused 4-inch cored openings and reestablish fire rating of floor.
 5. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors; and a minimum of four, 4-pair, Category 5 voice and data communication cables.

2.7 MULTIOUTLET ASSEMBLIES

- A. Components of Assemblies: Products from a single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.
- B. Raceway Material: PVC.
- C. Wire: No. 12 AWG.

2.8 FINISHES

- A. Color:
 - 1. Wiring Devices Connected to Normal Power System: As selected by Architect, unless otherwise indicated or required by NFPA 70.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install devices and assemblies level, plumb, and square with building lines.
- B. Install wall dimmers to achieve indicated rating after derating for ganging.
- C. Install unshared neutral conductors on line and load side of dimmers.
- D. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on bottom. Group adjacent switches under single, multigang wall plates.
- E. Remove wall plates and protect devices and assemblies during painting.
- F. Adjust locations of floor service outlets to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

- A. Comply with Division 16 Section "Basic Electrical Materials and Methods."
 - 1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 CONNECTIONS

- A. Ground equipment according to Division 16 Section "Grounding and Bonding."
- B. Connect wiring according to Division 16 Section "Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections:
 - 1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.
 - 2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

- B. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION

**SECTION 31 00 00
EARTHWORK**

1.00 GENERAL

1.01 DESCRIPTION

A. Principal work in this Section:

1. All excavating, filling, backfilling, compacting and grading required for the Project.
2. Adjusting manhole rims, grates, valve boxes, etc. to finished grade indicated.
3. Pumping, draining, shoring, cribbing and other protective measures.
4. Importing fill materials.
5. Shoring and cribbing.
6. Removing excess and unsatisfactory excavated materials from the site.

B. Related work in other Sections:

1. Selective Demolition: Section 02 41 13.
2. Site Clearing: Section 31 10 00.
3. Disconnecting utilities: Section 02 41 13.
4. Aggregate base under asphalt paving: Section 32 12 16.
5. Finish grading for landscaping and asphalt paving: Section 32 12 16.

1.02 QUALITY ASSURANCE

A. Lines and levels: All construction staking shall be provided by Contractor.

B. Inspections and tests: The Owner will employ a Geotechnical Consultant to inspect and test the work of this Section. At completion of this work, the Geotechnical Consultant will be required to submit written report certifying that the site was developed with acceptable materials in accordance with these Specifications and the recommendations of the Soil Investigation Report.

1. The Geotechnical Consultant will:

- a. Make the tests and inspections of the structural subgrades required by the nature of the subsurface conditions discovered during the progress of the earthwork operations.
- b. Approve for use of imported fill material.
- c. Inspect all filling, backfilling, and compacting of the soils.

1.03 SUBMITTALS

- A. Imported fill materials: Submit samples of proposed imported materials, minimum 40 lbs., tagged with source location and manufacturer to the Owner's Representative at least 15 days prior to import. Material shall not be imported to job site without written approval by the Owner's Representative.

1.04 GEOTECHNICAL INVESTIGATION

- A. A geotechnical investigation report has not been prepared for the site.

2.00 PRODUCTS

2.01 FILL MATERIALS

- A. Select (porous) fill under building slab-on-grade and behind retaining and basement walls: Clean gravel or crushed rock complying with CalTrans Standard Specifications, Section 68, Class 2.
- B. Imported fill materials and on-site select materials shall be granular in nature, non-expansive, free of organic materials, with a plasticity index of less than 12, and an expansion index of less than 20 and graded as follows:

| Sieve Size | Percentage Passing Sieve |
|------------|--------------------------|
| 3" | 100 |
| No. 4 | 60 - 100 |
| No. 200 | Less than 20 |

- C. On-site materials, less debris and organic matter, shall be approved by the Geotechnical Engineer.
- D. Import shall be approved by the Geotechnical Engineer.

3.00 EXECUTION

3.01 PROTECTIVE MEASURES

- A. Underground utilities: Report any lines encountered that are not indicated, or are in location other than indicated, on the Drawings to the Engineer's attention who will issue instruction for proceeding with the work.

- B. Moisture control: Remove water and debris, which would interfere with construction, from excavated areas and keep working areas dry when work is in progress. Grade perimeter of excavations so that water run-off drains away from the excavations.
1. Keep excavations free from loose material and water while fill is placed and compacted.
 2. Dispose of water resulting from dewatering operations in a manner that will not cause damage to public or private property, or constitute a nuisance or menace to the public.
 3. Make sure that debris and dirt generated by this work does not block existing storm drain system. Keep adjacent paving (outside Contract area) broom clean and free of debris and dirt. Clean any existing facilities that become plugged.
- C. Shoring, cribbing and bracing: Provide and install shoring, cribbing and bracing of the excavations as necessary to prevent cave-ins and to support and protect adjacent construction in accordance with Federal, State and local laws. Contractor shall be completely responsible for adequacy and safety of shoring design, construction, and removal.
- D. Benchmarks and monuments: Protect benchmarks, monuments and other reference points against displacement and damage. Repair or replace benchmarks, monuments and other permanent survey data that becomes displaced or damaged due to the performance of the work of this Section.
- E. Dust palliation: Keep down dust at the site by intermittent watering and sprinkling while the work of this Section is being performed. Earthwork operations shall be conducted so as to prevent windblown dust and dirt. Assume liability for all claims related to windblown dust and dirt. Apply water in accordance with applicable provisions of Section 17 of California Transportation Standard Specifications and with Section 1590 (e) of CAL/OSHA, Title 8.
- F. Protection of existing facilities and landscape: Protect all trees, plants, utilities and existing improvements to remain from injury and damage resulting from the work of this Section. Replace all damaged landscaping, improvements or utilities in kind. Refer to Section 31 10 00 for additional requirements on tree protection. Clean staging and other use areas of debris and dust upon completion of project. Re-stripe portions of parking lot where, in the opinion of the Owner's Representative, the striping was damaged or destroyed by Contractor's operations.
- G. Protection of completed work:
1. Protect finished areas from weather damage to prevent erosion of graded areas.
 2. Hauling and other activities on prepared grades which will deform them from required cross sections will not be permitted. Repair and re-compact damage to prepared grades caused by such operations at no additional cost to the Owner.

3.02 EXCAVATING AND FILLING

- A. Site clearing is specified in Section 31 10 00 and/or soils report. Verify that existing paving, curbs, light posts and other improvements, and all debris are removed from the site.
- B. After site has been properly cleared, stripped, and excavations to rough grade have been made, exposed surface soils in those areas to receive engineered fills, concrete slabs-on-grade, or pavements should be scarified to a depth of 12 inches, moisture conditioned, and compacted (see D). In building areas to receive concrete slabs-on-grade, sub-grade preparation shall extend at least 5 feet beyond the limits of the proposed structures and any adjoining flat work. In pavement areas and for exterior flatwork not connected to buildings, sub-grade preparation shall extend at least 2 feet beyond the back of the curbs or outside limits of flatwork.
- C. Any portions of the site which are disturbed or softened by standing water shall be re-graded and re-compacted to 90% of maximum density (ASTM D-1557) as recommended by the Owner's Representative. Portions of the site which show evidence of "pumping" or movement under load shall be excavated, dried out, or filled with bridging rock or other material determined to be suitable by the Owner's Representative, then recompacted to the above standards. All this work shall be done at no additional cost to the Owner.
- D. Place fill materials in loose lifts no more than 8" in uncompacted thicknesses. Compaction of fill should be accomplished by mechanical means only. Compact engineering fills consisting of expansive clay soil between 88% to 93% relative compaction at soil moisture content of between 3 and 5 percent above the laboratory optimum moisture content. Compact on-site or imported soils with low expansion potential to at least 90% relative compaction at soil moisture content of between 1 and 3 percent above the laboratory optimum moisture content. In pavement areas, the upper 12 inches of sub-grade shall be compacted to at least 95% percent relative compaction at soil moisture content 1 to 3 percent above optimum value. Aggregate base material in pavement areas shall be compacted slightly above the optimum moisture content to at least 95% relative compaction. Behind retaining walls, care should be taken to avoid over-compaction of the backfill materials. Avoid excessive wall movements and lateral pressures use lightweight hand-operated equipment to compact backfill within 3 feet behind retaining walls.
- E. Do not place fill during unfavorable weather conditions. If work is interrupted by heavy rain, do not resume operations until the proper moisture content and density of the materials have been achieved.
- F. Earth and rock, regardless of character and subsurface conditions, shall be excavated to depths shown on Drawings and to the neat dimensions of the footings wherever practicable, to permit pouring of footings and grade beams without use of side forms, except at slab perimeters.

3.04 BACKFILLING

- A. Place backfill in loose layers not exceeding 8" thick, as construction operations permit, but not before work to be covered has been inspected and approved, and loose soils and debris have been removed from the excavations.
- B. Do not place backfill during unfavorable weather conditions as specified for fill above.
- C. Compact backfill to 95% of maximum density (ASTM D1557).
- D. Where backfill is required on both sides of a structure, place it simultaneously so that the height of fill remains approximately equal on both sides at all times.
- E. Brace construction which has not been designed to withstand eccentric loading during backfilling.
- F. Backfill only after the structure to be backfilled against has attained its design strength or has been properly braced, to resist the load of the backfill. No compacting by jetting permitted.
- G. Keep rollers and other heavy equipment at least 4 feet from footings, foundations, piers and walls of building and appurtenances.

3.05 GRADING

- A. The locations and elevations of all construction are indicated on the Drawings and, unless inconsistencies are brought to the Owner's Representatives attention prior to commencement of work, the Contractor will be held responsible for the proper location and elevations of the completed work.
- B. Grade all areas to the lines and levels required. Keep grades straight between changes in elevations. Finish grading tolerance shall not exceed plus or minus one half inch ($\frac{1}{2}$ ") of required elevations, if evenly distributed.
- C. The required subgrade elevation shall be such that when subbase and indicated construction are added, the final elevations will be those shown on the Drawings.

3.07 FRAMES, COVERS, GRATES AND VALVE BOXES

- A. Adjust frames, grates, valve boxes, and covers of existing manholes, inlets, or other facilities to grade in conformance with Sections 15 of the CDT Standard Specifications.
- B. A structure located in a paved area shall not be constructed to final grade until the adjacent pavement or surfacing has been compacted.

3.08 DISPOSAL OF SURPLUS AND UNSUITABLE EXCAVATED MATERIALS

- A. Remove these materials from the Owner's site and dispose of them in a legal manner; this includes materials resulting from all excavations including elevator cylinder, concrete piles and utility excavations. Burning and burying materials on-site is prohibited.

3.09 FIELD QUALITY CONTROL

- A. Field density tests: To check the degree of compaction of native soils and fill will be taken by the Owner's Representative. The location and frequency of the tests will be at the Owner's Representative discretion.
- B. Verification of elevations: Owner will provide the services of a licensed Civil Engineer or Land Surveyor upon completion of earthwork operations to verify that grades are within the tolerances specified. Should the grades be found to be out of tolerance, the site shall be reworked and resurveyed by the Owner at the Contractor's expense.

END OF SECTION 31 00 00

**SECTION 31 10 00
SITE CLEARING****1.00 GENERAL****1.01 RELATED DOCUMENTS**

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

1.02 SUMMARY

- A. This Section includes, but is not limited to, the following:
 - 1. Protection of existing trees.
 - 2. Removal of trees and other vegetation.
 - 3. Topsoil stripping.
 - 4. Clearing and grubbing.
 - 5. Removing above-grade improvements.
 - 6. Removing below-grade improvements.
- B. Related work in other Sections: The following sections are noted as containing requirements that relate to this Section, but may not be limited to this listing.
 - 1. Earthwork: Section 31 00 00.
 - 2. Selective Site Demolition: Section 02 41 13.

1.03 PROJECT CONDITIONS

- A. Traffic: Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities, unless otherwise noted, without permission from authorities having jurisdiction.
- B. Protection of Existing Improvements: Provide protections necessary to prevent damage to existing improvements indicated to remain in place.
 - 1. Protect improvements on adjoining properties and on Owner's property.
 - 2. Restore damaged improvements to their original condition, as acceptable to property owners.

- C. **Protection of Existing Trees and Vegetation:** Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing.
1. Water trees and other vegetation to remain within limits of contract work as required to maintain their health during course of construction operations.
 2. Provide protection for roots over 1-1/2 inch diameter that are cut during construction operations. Coat cut faces with an emulsified asphalt, or other acceptable coating, formulated for use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.
 3. Repair or replace trees and vegetation indicated to remain which are damaged by construction operations, in a manner acceptable to Architect. Employ a licensed arborist to repair damages to trees and shrubs.
 4. Replace trees which cannot be repaired and restored to full-growth status, as determined by arborist.
- D. **Improvements on Adjoining Property:** Authority for performing removal and alteration work on property adjoining Owner's property will be obtained by Owner prior to award of contract.
1. Extent of work on adjacent property is indicated on Drawings.
- E. **Salvable Improvements:** Carefully remove items indicated to be salvaged (to remain property of Owner), and store on Owner's premises where indicated or directed.

2.00 PRODUCTS (Not Applicable)

3.00 EXECUTION

3.01 SITE CLEARING

- A. **General:** Remove trees, shrubs, grass and other vegetation, improvements, or obstructions as required to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated. "Removal" includes digging out and off-site disposing of stumps and roots or other material.
1. Cut minor roots and branches of trees indicated to remain in a clean and careful manner, where such roots and branches obstruct installation of new construction.
- B. **Topsoil:** Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and

other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.

1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.
2. Stockpile suitable topsoil in storage piles in areas indicated or directed. Construct storage piles to provide free drainage of surface water. Cover storage piles, if required, to prevent wind erosion.
3. Dispose of unsuitable or excess topsoil same as specified for disposal of waste material, or use for fill if approved by Architect or Soils Engineer.

C. **Clearing and Grubbing:** Clear site of trees, shrubs and other vegetation, except for those indicated to be left standing.

1. Completely remove stumps, roots, and other debris protruding through ground surface.
2. Use only hand methods for grubbing inside drip line of trees indicated to remain.
3. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.

D. **Removal of Improvements:** Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.

1. Abandonment or removal of certain underground pipe or conduits may be indicated on civil, plumbing, mechanical or electrical drawings. Removal of abandoned underground piping or conduit is included under this Section.

3.02 DISPOSAL OF WASTE MATERIALS

- A. **Burning on Owner's Property:** Burning is not permitted on Owner's property.
- B. **Removal from Owner's Property:** Remove waste materials and unsuitable or excess topsoil from Owner's property, except as otherwise noted.

END OF SECTION 31 10 00

**SECTION 32 12 16
ASPHALT CONCRETE PAVING**

1.00 GENERAL

1.01 DESCRIPTION

A. Principal work in this Section:

1. Aggregate base material.
2. Prime coating.
3. Paint binder as required herein.
4. Asphalt concrete.
5. Seal coat.

B. Related work in other Sections:

- 1 Earthwork: Section 31 00 00.
- 2 Curbs and gutters: Section 32 16 00.
- 3 Pavement marking and accessories: Section 32 17 23.

1.02 QUALITY ASSURANCE

A. Reference standards: Applicable provisions of the following govern the work of this Section.

1. American Association of State Highway and Transportation Officials (AASHTO), M 288-96 or Latest Version Thereof.
2. California Department of Transportation (CDT).
 - a. Standard Specifications: Sections 26, 37, 39, 92, 93, and 94.
 - b. Standard Test Method No. 399A.

B. All work in this Section shall conform to Sections 26, 37, 92, 93, and 94 of the Standard Specifications (CDT).

1.03 SUBMITTALS

A. Certificates: Submit the following:

1. Two copies of material certificates signed by the material producer and the Contractor, certifying that each material item complies with, or exceeds specified requirements.
2. Certified weight or load slip to the Owner's representative for each load of material used in the construction of the asphalt concrete pavement.

1.04 SITE CONDITIONS

A. Prime coat, seal coat and paint binder.

1. Apply only when the ambient temperature is above 50°F and when temperature has not been below 30°F for 12 hours immediately prior to application.
2. Do not apply when base or surfaces are wet or contain an excess of moisture.

B. Construct asphalt concrete surface course only when atmospheric temperature is above 40°F and when base is dry.

2.00 PRODUCTS

2.01 AGGREGATE BASE

- A. Class 2 aggregate base, three quarter inch ($\frac{3}{4}$ ") maximum size, as specified in Section 26 of the CDT Standard Specifications.
- B. Mineral aggregate shall be Type B mineral aggregate as specified in Section 39 of the CDT Standard Specifications.
- C. Grading of combined aggregates for new pavement shall be $\frac{1}{2}$ " maximum size, medium grading, except asphaltic concrete for overlaying existing paved surfaces shall be $\frac{3}{8}$ " maximum size.
- D. Liquid asphalt for prime coat: Grade SC-70 in conformance with Section 93 of the CDT Standard Specifications.
- E. Asphaltic emulsion for paint binder and fog seal coat: Emulsified asphalt, Type SS-1h, conforming to Section 94 of the CDT Standard Specifications.

3.00 EXECUTION

3.01 PREPARATION

- A. Subgrade: The upper 12" of subgrade shall be compacted to 95% per Section 31 00 00 of these Specifications.
- B. Crack sealing:

1. Before sealing, cracks shall be cleared of dirt, dust, soil vegetation debris, and other deleterious materials by means of air blowing to a depth of ¼" to ½".
2. Cracks 1/8" in width and greater in existing AC paving to be overlaid and shall be sealed.
3. Applications of crack sealer shall be in accordance with the manufacturer's recommendations or as directed by the Owner's representative.

3.02 AGGREGATE BASE

- A. Place, spread and compact in conformance with Section 26 of the CDT Standard Specifications.

3.03 ASPHALT CONCRETE PAVING

- A. Proportion, mix, place, spread and compact in conformance with Section 39 of the CDT Standard Specifications.
- B. Before placing asphalt concrete on untreated base, apply liquid asphalt prime coat to base course in conformance with Section 39 of the CalTrans Standard Specifications. Apply prime coat at the rate of 0.25 gallons per square yard.
- C. Before placing asphalt concrete, apply an asphalt emulsion tack coat (paint binder) to vertical surfaces of existing pavement, curbs, gutters, construction joints and existing pavement to be surfaced, in conformance with Section 39 of the CDT Standard Specifications.
- D. Spread and compact asphalt concrete in accordance with Section 39 of CDT Standard Specifications.
- E. Apply seal coat to all finished surfaces of asphalt concrete pavement in accordance with Section 37 of the CDT Standard Specifications.
- F. After seal coat has been applied, allow ample time for drying before traffic is allowed on the pavement or paint striping is applied.

3.04 FIELD QUALITY CONTROL

- A. Aggregate Base: The surface of finished aggregate base shall vary no more than 0.05' above or below the grade indicated.
- B. Asphalt Concrete Paving:
 1. The finished asphalt pavement, where not controlled by adjacent structures or features, shall not vary more than 0.05 feet above or below the planned grade, providing it is uniform and free of sharp breaks and does not pond water.

2. The cross section of the finished pavement shall be free of ridges and valleys and shall not vary more than 0.03' above or below the theoretical section at any point on the cross section.
3. The specified thickness of the finished pavement shall be the minimum acceptable.
4. Conforms shall form a smooth, pond free, transition between existing and new pavement.

END OF SECTION 32 12 16

SECTION 32 13 12
SITE CONCRETE REINFORCING

1.00 GENERAL

1.01 DESCRIPTION

A. Principal work in this Section:

1. Reinforcing steel for site cast in place concrete.
2. Accessories such as chairs and tie wires.

B. Related work in other Sections:

1. Curb and Gutters: Section 32 16 00.
2. Site Cast-in-Place Concrete: Section 32 13 13.

1.02 QUALITY ASSURANCE

A. Source quality control:

1. The Contractor shall ensure that the material delivered for use is that represented by the mill reports and obtain copies of mill reports, examine them, certify whether the material represented complies with Specifications requirements, and make distribution of reports as required. Report chemical composition of each heat, as determined by ladle analysis.
2. Where materials proposed for use cannot be identified, the Contractor shall pay for an approved testing laboratory to make one series of tests (tensile and bend) from each 2.5 tons, or fraction thereof, of each size and kind of reinforcing steel.

B. Standards: The applicable provisions of the following govern the work of this Section:

1. ACI 301 Specifications for Structural Concrete for Buildings.
2. ACI 318 Building Code Requirements For Reinforced Concrete.
3. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice.
3. ACI SP 66 American Concrete Institute Detailing Manual.
4. ANSI/ASTM A497 Welded Deformed Steel Wire Fabric for Concrete Reinforcement.

1.03 SUBMITTALS

- A. Submit bar drawings, schedules and placing diagrams for reinforcing steel. Submit bar drawings and schedules with the corresponding placing diagrams. Drawings shall be complete for any specific area of Project at the time they are submitted.

1.04 HANDLING

- A. Comply with the requirements of Specification.
- B. Marking and shipping reinforcement: Bundle and tag with suitable identification. Transport to and store at the site to avoid damage to material. Maintain tags after bundles are broken.

2.00 PRODUCTS

2.01 MATERIALS

- A. Reinforcement Steel - Bar Reinforcement - ASTM A 615 Grade 60 (ASTM A 615M Grade 400), deformed.
- B. Reinforcement Steel - Reinforcing Fabric - Welded wire fabric - ASTM A 185, welded steel wire fabric.
- C. Stirrup steel: ANSI/ASTM A1064.
- D. Tie wire: 16 gauge (min.) annealed steel wire.
- E. Chairs and similar support items:
 - 1. Standard manufactured products conforming to CRSI Manual of Standard Practice, MSP-2.
 - 2. Use dense precast concrete bar support with embedded wire ties for reinforcement placed on grade; elsewhere reinforcement shall be supported by wire bar supports.

2.02 FABRICATION

- A. General: Except as modified by the Drawings and the Specifications, comply with CRSI and WCRSI Manual of Standard Practice for Reinforced Concrete Construction, for fabrication of reinforcing steel.
- B. Bending and forming:
 - 1. Fabricated steel bars, wire and fabric of indicated sizes, lengths, and gauges and accurately form to shapes indicated by methods that will not injure the materials.
 - 2. Do not heat reinforcement for bending. Do not install bars with unscheduled kinks or bends.

3.00 EXECUTION

3.01 PLACING

- A. Cleaning: Clean reinforcement of oil or other coating that might destroy or reduce its bond with concrete before placing it.
- B. Placing: Conform to the Manual of Standard Practice for Reinforced Concrete Construction by CRSI and WCRSI, and the following:
 - 1. Accurately place reinforcement and securely tie in position with steel wire at points where bars cross to hold them against displacement.
 - 2. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- C. Spacing of reinforcement:
 - 1. Space reinforcement to maintain the proper distance and clearance between parallel bars and between bars and forms. Provide metal spreaders and spacers to hold horizontal steel in position.
 - 2. Support steel at proper height by using galvanized "S" chairs, or "Support Bars" and galvanized "S" chairs, with hangers, or in other manner, as necessary.
 - 3. Where "Support Bars" are used to hold the slab reinforcement in place, space chairs under the support bars not to exceed the distances specified previously.
- D. Splicing:
 - 1. Stagger all lap splices. Bars shall be in contact, unless noted otherwise on the Drawings, at lapped splices and shall be firmly wired together before placing concrete. Lap bars as indicated.
 - 2. Extend stubs and dowels required to receive and engage subsequent work a sufficient length to develop the strength of the bar. Place dowel and stub bars in the forms and secure against displacement during placing of concrete.
- E. Maintain clear distances between reinforced steel and face of concrete indicated on the Drawings.
- F. Dowels in existing concrete:
 - 1. When drilling for dowels in existing concrete, use sharp bits, drill hole full depth and slightly oversize, fill with a 6000 psi epoxy and hammer dowel to refusal

END OF SECTION 32 13 12

**SECTION 32 13 13
SITE CAST-IN-PLACE CONCRETE**

1.00 GENERAL

1.01 DESCRIPTION

A. Principal work in this Section:

1. Site Cast-in-place concrete.
2. Shotcrete.
3. Replacement concrete (patios, walks, steps, etc.).

B. Related work in other Sections:

1. Site Reinforcing steel: Section 32 13 12.
2. Earthwork: Section 31 00 00.

1.02 QUALITY ASSURANCE

A. Reference standards: Applicable provisions of the following govern the work of this Section.

1. ACI 301, Specifications for Structural Concrete for Buildings.
2. ACI302, Recommended Practice for Concrete Floor and Slab Construction.
3. ACI 304, Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
4. ACI 305, Recommended Practice for Hot Weather Concreting.
5. ACI 306, Recommended Practice for Cold Weather Concreting.

B. Source quality control:

1. Employ a testing laboratory, acceptable to the Owner, and Engineer, to test the materials for conformance with these Specifications before concrete mixes are established, and when source is changed, unless recent test results of materials to be used on the Project, performed by an acceptable testing laboratory, are accepted by the Engineer.
2. Testing coarse aggregates:

- a. Test aggregate before and after concrete mix is established and whenever the character source of material is changed, but not less than one test for each 50 cubic yards.
 - b. Perform a sieve analysis to determine conformity with limits of gradation. Perform sampling and testing according to ASTM C33, and as follows:
 - 1) Sampling of aggregates: ASTM D75. Take samples of aggregates at source of supply, or if source of supply has been approved, from storage bunkers at ready-mixed concrete plant.
 - 2) Testing of aggregates shall include:
 - a) Sieve analysis: ASTM C136.
 - b) Organic impurities: ASTM C40. Fine aggregate shall develop a color not darker than the referenced standard color.
 - c) Soundness: ASTM C88. Loss after 5 cycles not over 8% for coarse aggregate, nor 10% for fine aggregate.
 - d) Abrasion of concrete aggregate: ASTM C131. Weight loss not over 10-1/2% after 100 revolutions, nor 42% after 500 revolutions.
 - e) Deleterious materials: ASTM C33.
 - f) Materials passing No. 200 sieve: ASTM C117, not over 1% for gravel, 1.5% for crushed aggregate per ASTM C33.
 - g) Reactive materials: ASTM C289. aggregates shall indicate no potential deleterious reactivity.
 - h) Definitions: ASTM C125.
3. Cement test:
- a. The cement mill laboratory will be acceptable as testing laboratory for this purpose when approved by the Building Department. Submit evidence to show that the cement mill laboratory is qualified to perform tests. The laboratory shall make tests for every 500 barrels or fraction thereof for of cement used in accordance with ASTM C150.
 - b. Make tensile strength test at 7 days. Tag the cement for identification at the location of sampling. A representative of the Testing Laboratory shall certify that materials being used are taken from the lots sampled and tested for this report.

2.00 PRODUCTS

2.01 MATERIALS

- A. Portland cement: ASTM C150, Type I or II low alkali with air entrainment as required. Do not change brand or type of cement without Engineer's written approval.
- B. Aggregates:
 - 1. Hardrock aggregates: ASTM C33 graded so that coarse aggregates nominal size is not larger than 1/5 the narrowest dimensions between form faces; nor 3/4 of the minimum clear spacing between individual reinforcing bars or bundles of bars, but never greater than 3/4" in any dimension for slabs 4" thick or less; 1-1/2" at all other locations.
- C. Admixtures: ASTM C494, Type A, admixtures shall contain no chlorides and may be used only with the Engineers approval, except as specified. Submit manufacturer's data for products proposed for use to the Engineer.
- D. Pozzolanic Fly Ash: ASTM C618, Class F.
- E. Water: Fresh, clean, and free of oil and other materials injurious to concrete.
- F. Concrete curing compound:
 - 1. Liquid membrane-curing compound containing a fugitive dye, conforming to ASTM C309, Type I, guaranteed not to affect the bond, adhesion, or effectiveness of finishes and surface treatment specified herein to be applied to concrete.
- G. Expansion joint materials:
 - 1. Joint filler: Homex Expansion Joint by Homasote Co. or equal non-bituminous product compatible with sealant specified in Section 07 90 00 per ASTM D 1751.
 - 2. Joint sealant and back-up rod: As specified in Section 07 90 00.
- H. Dry pack and grout: One of the following or equal.
 - 1. Masterflow 713 by Master Builders.
 - 2. Five Star Grout by U.S. Grout Corporation.
 - 3. Fondag Nonshrink Grout by Specrete Products, Ltd.
- I. Aggregate Base: Class 2 aggregate base, three quarter inch (¾") maximum size, as specified in Section 26 of the CalTrans Standard Specifications.

2.02 MIXES

A. Mix design:

1. Employ a testing laboratory, acceptable to the Owner's Representative, to design all structural concrete mixes required for the Project to provide:
 - a. Normal weight concrete with 3000 psi 28-day compressive strength, unless noted otherwise on the Drawings.
 - b. Adequate workability and proper consistency to permit concrete to be worked readily into the forms and around reinforcement without segregation and excessive bleeding.
 - c. Other requirements of these Specifications.
2. Proper proportions for design mixes shall be in accordance with ACI 211 or ACI 318.
3. Proper water-cement ratio shall be determined by the preliminary test made in accordance with ASTM C192.
4. Slump limits: Proportion and design mixes to result in the following concrete slump at point of placement.
 - a. Tieback anchors: Not more than 7".
 - b. Piers: Not less than 4" and not more than 6".
 - c. All other concrete: Not less than 1" and not more than 4".
5. Use air-entering admixture in all concrete, unless otherwise shown or specified. Add air-entering admixture at manufacturer's prescribed rate to result in concrete at point of placement having air content within 3% to 6%.
6. Tests shall be conducted in accordance with ASTM C39.

B. Submit report showing results of sieve analysis, mix design and results of compression tests. Make test specimens from not less than 3 batches of each design specimens from not less than 3 batches of each design mix. The trial batch strength for each mix shall exceed indicated f_c by 25% or a lesser amount based on standard deviations of strength test records according to ACI 318. Do not start concrete production until mixes have been reviewed and are acceptable to the Engineer.

C. For each batch, weigh the fine and coarse aggregate separately, measure cement and water separately and introduce separately into the mix so that proportions can be accurately controlled and easily checked.

D. Do not change proportions established by the accepted mix design without the Engineer's written approval.

1. Cement: If concrete develops less than required minimum strength, adjust mix proportions and increase the amount of cement, as necessary.
2. Water: Do not exceed predetermined amount of water because of slowness of discharge from mixer necessary to produce concrete that will work readily into corners and angles of forms and around reinforcements, without segregation of materials and without free water collecting on the surface.
3. Aggregates: Reasonable variations in grading will be allowed by the Engineer because of characteristics of available materials and the need for workability and strength.

E. Concrete mixing:

1. Mixing and delivery shall comply with ASTM C94, these Specifications, and applicable Building Code requirements. If the referenced specifications, these Specifications or the Building Code conflict, comply with the most restrictive requirement.
2. The Owner's Testing Agency will perform check sieve analysis of the aggregates being used, check compliance with mix design and the cement being used against mix design; check that water has been removed from the drum before adding mix ingredients for the following load and shall witness the loading of mixing trucks. The Owner's Testing Agency will send a written report of each inspection to Engineer indicating compliance with these Specifications.
3. Provide a ticket signed by an authorized representative of the batching plant with each mixer truck of concrete delivered to the site indicating:

Name of Project.
Date of Delivery
Supplier of Concrete.
Brand of Cement.
Truck Identity and
Cement Content.
Ticket Serial Number.
Strength Classification.
Batching Time.
Admixture Content.
Point of Deposit.
Name of Contractor.
Total Amount of Water.
Water Added at Jobsite.
Name of Driver.
Weight of Aggregate.
Time loaded and First
Daily Temperature
Mixing Concrete.
Number of Cubic Yards

Reading of Revolution in Load.

4. Store batch tickets at time concrete is delivered in job file for reference at the site.
5. Remove all materials, including water, remaining in the ready-mix truck drum completely before ingredients for the following loads are introduced into the drum.
6. Retempered concrete: Do not use concrete which has not been placed 30 minutes after leaving the mixer, or concrete that is not placed within 60 minutes after water is introduced into the mix.

3.00 EXECUTION

3.01 PREPARATION

- A. Inspect excavations, subgrades and formwork, as applicable for each placing operation, for accuracy of lines, levels, elevations and dimensions. Make necessary corrections to obtain concrete within the tolerances specified.
- B. Inspect placement of reinforcement and accessories for proper positions, sizes, clearances, fastenings, laps and splices.
- C. Moisten, do not saturate, earth subgrade and bearing surfaces. Moisten the sand base under slabs-on-grade the day before concrete is to be cast thereon.
- D. Wet wood forms thoroughly when they are not treated with form release agent. Wet other materials sufficiently to reduce suction and maintain concrete workability.
- E. Recompact disturbed gravel fill and install vapor barrier under building slabs on grade. Lap joints 4". Lap on walls 2". Cut patches at penetrations for a tight fit. Tape all joints to make moisture tight. Cover vapor barrier with a minimum of 2" of damp concrete sand.
- F. Embedded items including, but not limited to, conduits, anchors and rough hardware, built into concrete as indicated or required.
 1. Do not embed piping and conduits, other than electrical conduits, in structural concrete. Locate conduits so as to reduce strength of the structure the least amount, as approved by the Engineer, and as indicated on the Drawings.
 2. Embed bolts, inserts and other items in the concrete, accurately secured so that they are not displaced during concrete placing and compacting operations.
 3. Set embedded bolts for materials and equipment attached to concrete to template, layouts and shop drawings. Verify size, length and location of electric conduit with respect to equipment supports.

- G. Do not proceed with placement of concrete until all conditions are satisfactory.

3.02 CONVEYING

- A. Rapid handling: Transport concrete from the mixer to location of placing as rapidly as practical to avoid separation or loss of ingredients.
- B. Transporting methods: Use cranes, carts, buggies or other approved means to deliver concrete to final locations. Do not use delivery systems (pipe, chutes, etc.) formed of aluminum for transporting concrete. If pumping of concrete is contemplated, first obtain Engineer's approval for the design mix and the placement method before placing concrete.
- C. Free fall: Not more than 4 ft. in concrete which will remain exposed in the Work; no more than 6 ft. elsewhere. Avoid large concentration of concrete in one location which would produce unacceptable deflection in supporting formwork or on one side of steel soldier beam.
- D. Lifts: No more than 2 ft. high.
- E. Concrete flow: Carry concrete up uniformly for the length of walls being placed to reduce lateral flow of concrete to 5 ft. maximum.
- F. Runways: Construct substantial runways and scaffolding to avoid movement and vibration in the forms and reinforcing steel as a result of transporting and placing concrete.

3.03 PLACING

- A. General: Comply with ACI 304. Do not place concrete in or under water.
- B. Consolidation: Thoroughly consolidate concrete and work it around reinforcement and embedded items and into corners and angles of forms, by spading, rodding and tamping to exclude rock pockets, air bubbles and "honeycombs" and to obtain required density and strength.
- C. Internal vibration:
1. Use mechanical vibrators to consolidate each layer with that previously placed, to completely consolidate the concrete in forms. Take care to avoid over-vibration, causing separation of ingredients. Keep extra standby vibrator at the site.
 2. Vibration of pier concrete below grade is not required.
- D. Flow of concrete: Keep surface of concrete level during placing, with a minimum of concrete allowed to flow from one position to another. Place concrete in a continuous operation until each section or panel has been completed.

- E. Record: Keep records showing location, date and time of placement of all concrete batches.
- F. Temperature: Do not place concrete when the ambient temperature is above +85°F or below +40°F. at the time of placing, or if it is likely to go above +85°F or below +40°F before the concrete has taken its initial set, unless special precautions recommended by ACI 305 and 306 are provided.
- G. Construction joints:
1. Location:
 - a. Locate construction joints where indicated. When not shown, submit layout showing location of construction joints and placing procedure, for the Engineer's approval, before placing concrete.
 - b. Locate construction joints to least impair the strength and appearance of structure.
 - c. Off-set construction joints not less than 5 ft. with a minimum of 2 offsets.
 2. Joints in channels: Locate as detailed on the Drawings.
 3. Contact surfaces: Keep exposed face of construction joints continuously moist from time of initial set until subsequent placing of concrete against them, but not to exceed the curing period.
 - a. Clean contact surfaces thoroughly by chipping entire surface not earlier than 5 days after initial placing.
 - b. As an option, jet wash or sandblast the surface to expose clean aggregate solidly embedded in the mortar matrix; remove wash water entirely from surface.
 - c. If a contact surface becomes coated with foreign materials of any nature, after being cleaned, chip or rechip the surface completely, to suitable condition.
- H. Tolerances: In compliance with ACI 117 as follows.
1. Paragraph 2.1, except for reference to slip-forming.
 2. Paragraph 2.2, Class AX.
 3. Paragraph 3.6.
- 3.04 FINISHING
- A. Formed concrete surfaces:

1. General:
 - a. Remove fins, laitance and loose material from concrete surfaces when forms are removed.
 - b. Repair concrete honeycombs, rock pockets, sand runs, spalls, or otherwise damaged surfaces by removing the damaged or unsatisfactory area to sound concrete, with slightly undercut edges, and filling-in with the same mix as the adjacent concrete minus the coarse aggregate.
 - c. Tamp and float the patch flush with adjacent surface.
 2. Shotcrete walls: Provide a "rubbed finish" as defined in ACI 301 to produce a uniform surface by float trowel or rub board immediately after shotcrete is applied.
 3. Clean surface of pier cast below grade by sandblasting. Apply a sand-cement mortar, trowel and rub to match shotcrete finish.
- B. Top of grade beams, footings and pier caps: Screed to elevations indicated.
- C. Channels:
1. Protection: Protect exposed flatwork as necessary to prevent damage resulting from impact or from subsequent work.
 - a. Protect work of other trades from damage by covering it with heavy kraft paper securely taped in place. Leave protection in place as long as its need exists.
 - b. Control the use of water and other contaminants within the area so that no damage to previously installed work or existing structure and finish occurs.
 2. Compacting and floating:
 - a. Bring channels to proper elevations and strike off with a straightedge. Remove excess water and laitance.
 - 1) Compact by rolling with weighted rollers or by tamping with grid tampers. Thoroughly hand-tamp areas not accessible to rollers.
 - 2) Float and test surfaces with a 10 ft. straightedge and eliminate high and low spots to comply with tolerances specified.
 - 3) From this point, use the methods and tools necessary to produce surface tolerances and finishes specified.

- b. Use screeds to type and spacing required to produce specified channel tolerance.
 - 3. Moisture control: In addition to other finishing requirements, use a water fog spray to reduce plastic shrinkage cracks during flatwork finishing operations when conditions of low humidity and/or high temperature exist.
 - a. Immediately after concrete has been brought to a flat surface and the shiny film of moisture disappears, restore it and maintain until final troweling by applying a light film of moisture with an atomizing type fog sprayer.
 - b. Use frequent light applications of moisture rather than excessive amounts at any one time. Adjust the amount and refrequency of fog spray as required by variable conditions of weather, wind, temperature and humidity.
 - 4. General requirements:
 - a. Finish surfaces to produce a uniform appearance throughout area involved and throughout adjacent areas with the same treatment.
 - b. Where concrete finishing occurs adjacent to finished metal or other surfaces, particularly where serrated or indented surfaces before allowing to harden.
 - c. Use no troweling machines within 12" of electrical junction and outlet boxes which are set to finish flush with concrete floors. Float and trowel such areas by hand with wood floats and steel trowels, taking care to see that concrete is finished flush with box cover and matches adjacent surfaces.
 - 5. Schedule of finishes:
 - a. Float surfaces to produce a uniform broom sweep texture and finish throughout.
 - b. Provide an equivalent of a medium salted finish along concrete surfaces at slopes of less than 6%.
 - c. Provide an equivalent of a heavy broom slip resistant finish along concrete surfaces at slopes of 6% and greater.
- D. Curbs: Immediately after removing forms, finish faces and top with a steel trowel.

3.05 CURING

- A. Formed concrete:

1. Wet the tops and exposed portions of formed concrete and keep moist until forms are removed.
 2. If forms are removed before 14 days after concrete is cast, coat concrete with curing compound as specified for flatwork below.
- B. Concrete flatwork:
1. After finishing, spray the specified curing compound uniformly in 2 coats at 90° to each other not exceeding coverage rates recommended by the manufacturer.
 2. Inspect treated surfaces daily for 14 days for evidence of drying. Re-wet the surfaces and apply a new application of curing compound if premature drying occurs, as soon as can be done after finishing without marring the surfaces.
- C. Pits, trenches and curbs: Construct pits for transformers, sumps, valves, trenches, curbs, gutters, and other miscellaneous concrete work.
- D. Grouting and drypacking: Install as indicated and required, except for items grouted by other trades.
1. Mix material, in accordance with its manufacturer's instructions, with sufficient water so it flows under its own weight for grout, and to just moisten and bind the materials together for drypack.
 2. Place drypack by forcing and rodding to fill all voids and provide complete bearing under plates. Place fluid grout from one side only and puddle to completely fill voids; do not remove dams or forms until grout attains initial set. Finish exposed surfaces smooth, and damp cure at least 3 days.
- E. Splash block: Precast in tight molds, to the dimensions and profiles indicated. Use a mix with coarse aggregates passing 3/8" sieve to obtain a compressive strength of 3,500 psi minimum at 28 days. Steel trowel unformed surface.

3.06 PROTECTING AND CLEARING

- A. Protect finished surfaces from stains or abrasions. Do not allow fire in direct contact with concrete. Provide adequate protection against injurious action by sun or wind. Protect fresh concrete from heavy rain and mechanical injury.
- B. Upon completion, wash and clean exposed concrete and leave free of oil, paint, plaster and foreign substances, ready to receive applied finishes or to be left exposed.

3.07 DEFECTIVE CONCRETE

- A. Concrete finishes which are not within the specified tolerances nor finished as specified which do not connect properly to adjoining work, do not slope to drains or are not properly cured, or do not meet other provisions of the Specifications, will be deemed defective.
- B. Remove defective concrete as directed by Engineer and replace with concrete of specified strength.

3.08 FIELD QUALITY CONTROL

- A. Concrete quality control: The following will be performed by the Owner's Testing Agency.
 - 1. Samples will be taken during progress of the work for determination of slump, compression strength, aggregate sieve analysis, and grout-mix tests, with assistance furnished by the Contractor.
 - 2. 3 cylinders will be made for each day's pour or for each 100 cubic yards or less, or once for each 5,000 square feet of surface area, whichever is less, for each type of concrete being cast.
 - 3. 1 cylinder will be tested at 7 days, and 1 cylinder at 28 days. The remaining cylinder will be kept in reserve in case tests are unsatisfactory.
 - 4. Samples will be made in accordance with ASTM C172.
 - 5. Specimens will be made and laboratory cured in accordance with ASTM C31.
 - 6. The 28-day values will be the criteria for acceptance of concrete regarding strength only.
 - a. 7-day tests may be regarded as indicative of compliance or non-compliance with the 28-day strength requirements, and the Contractor should be guided accordingly in matter of adjusting proportions, if necessary, and notify the Engineer.
 - b. 7-day tests shall also be a guide to the Contractor regarding time for form removal.
 - 7. Slump tests will be made for each set of tests cylinders in accordance with ASTM C142.
- B. Tests evaluation:
 - 1. Concrete cylinder test will be evaluated in accordance with ACI 214 and 318.
 - 2. If 28-day test results indicate the concrete strength is not as specified, core concrete as directed by the Engineer in accordance with ASTM C42.
 - a. Plug core hole solid as specified in Article 3.04 of this Section.

- b. The cost of cores, tests and patching shall be borne by the Contractor.
- 3. In the event that additional core tests do not show strength required, or as determined by load tests made in accordance with ACI 318, the defective concrete shall be removed and replaced or shall be reinforced as directed by the Engineer at the Contractor's expense.
- 4. If core tests results fall below design strength specified, adjust the concrete mix or water content for future batches, at not additional cost to the Owner.

END OF SECTION 32 13 13

**SECTION 32 16 00
CURBS AND GUTTERS**

1.00 GENERAL

1.01 DESCRIPTION

A. Principal work in this Section:

1. Construction of concrete curbs, gutters, walks, driveway cuts, pedestrian ramps and other concrete surfacing as required.
2. Concrete retaining wall.

B. Related work in other Sections:

1. Earthwork: Section 31 00 00.
2. Asphalt concrete paving: Section 32 12 16.

1.02 QUALITY ASSURANCE

A. Reference standards: The applicable provisions of the following govern the work of this section.

1. American Society for Testing Materials (ASTM).
 - a. A615: Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
 - b. C150: Portland Cement.
2. California Department of Transportation (CDT), Standard Specifications: Sections 51, 52, 73 and 90.

1.03 SUBMITTALS

- A. If requested, submit mill test reports on the cement, reinforcement bars and aggregates, showing compliance with the respective specifications. The Owner's Testing Agency may make concrete test cylinders and slump tests as deemed necessary to determine compliance with Specifications.

2.00 PRODUCTS

2.01 PORTLAND CEMENT CONCRETE (PCC)

- A. Concrete: Class A (6 sacks of cement per cubic yard of concrete) conforming to Section 90 of the CDT Standard Specifications.

- B. Cement: Type II conforming to ASTM C150 as modified by Section 90 of the CDT Standard Specifications.
- C. Aggregate: $\frac{3}{4}$ " maximum size conforming to Section 90 of the CDT Standard Specifications.
- D. Water: Clear and free from injurious amounts of oil, acid, alkali, organic matter or other deleterious substances.
- E. Reinforcing Bars: ASTM A615, intermediate grade, deformed in accordance with Section 52 of the CDT Standard Specifications.
- F. Filled Joints: Unless noted otherwise on the Drawings $\frac{1}{2}$ " thick, the full depth of the concrete section and conforming to Section 51 of the CDT Standard Specifications.
- G. Joint Filler: bitumen-treated fiber board per CDT Standard Specifications, Section 51. Premolded expansion joint filler shall conform to the requirements in ASTM Designation D 1751 Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- H. Waterproof Joint Sealant: flexible polyurethane.
- I. Carbon black shall be added to concrete for curbs, gutters and sidewalks as required to match existing work.
- J. No admixtures will be allowed without Owner's Representative approval.
- K. Maximum water cement ratio (w/c) of 0.50.
- L. Maximum slump of 4".
- M. Aggregate Base: Class 2 aggregate base, three quarter inch ($\frac{3}{4}$ ") maximum size, as specified in Section 26 of the CalTrans Standard Specifications.

3.00 EXECUTION

3.01 CONCRETE CONSTRUCTION

- A. Concrete shall be mixed in accordance with applicable provisions of Section 90 of the CDT Standard Specifications.
- B. Construction of concrete substances shall conform to applicable provisions of Section 51 of the CDT Standard Specifications. Unless noted otherwise in these Specifications, exposed surfaces of structure shall have Class 1 surface finish.
- C. Construct concrete curbs and sidewalks in accordance with applicable provisions of Section 73 of the CDT Standard Specifications.

- D. Curing shall conform to applicable portions of Section 90 of the CDT Standard Specifications. Do not use pigment in curing compounds.
- E. All work shall be subject to inspection. No concrete shall be placed until the Owner's Representative has approved the forms and reinforcement.
- F. Place expansion joints on curbs, gutters and walks at 20' on center, adjacent to structures, and at all returns, and fill with joint filler. Score joints shall be formed at 10' on center; the score shall be 1" deep.
- G. Do not drop concrete freely where reinforcing bars will cause segregation, nor more than 6'-0" vertically. Use spouts, elephant trunks, or other approved means to prevent segregation.

END OF SECTION 32 16 00

**SECTION 32 17 23
PAVEMENT MARKING AND ACCESSORIES****1.00 DESCRIPTION****A. Principal work in this Section:**

1. Traffic control signs.
2. Stripes and pavement markings and removal of existing striping, if required.
3. Raised pavement markers.

B. Related work in other Sections:

1. Section 32 12 16: Asphalt concrete paving.

1.01 QUALITY ASSURANCE**A. Reference standards: Applicable provisions of the following govern the work of this Section as listed below:**

1. California Department of Transportation (CDT)
 - a. Maintenance manual.
 - b. Standard Specifications: Sections 56, 82, 84, 85, 90, 91, 94 and 95.
 - c. Traffic manual: Chapters 4, 6, and 7.

B. Specifications, standards, tests and recommended methods cited herein from the following trade, industry and government organizations shall determine quantity and quality of materials and methods unless specifically designated otherwise.

1. The State of California Materials and Research Department.
2. The State of California Traffic Manual, latest edition.
3. The California Maintenance Manual, latest edition.

1.02 SUBMITTALS**A. Submit Product Data under 2.00 Products, certifying that each product complies with specified requirements.****2.00 PRODUCTS****2.01 TRAFFIC PAINT**

- A. Paint shall be a good quality traffic paint conforming to or exceeding the standards set forth by Section 84 "Traffic Stripes and Pavement Markings". Common brands are Kelly Moore, Crown Products, Desoto and Ennis.
- B. Paint shall be thoroughly mixed prior to placing in painting equipment.

2.02 REFLECTORIZED MARKERS AND POSTS

- A. Reflectorized metal markers, metal marker posts and mounting hardware shall be of the size, type and description noted on the plans and shall conform to the applicable requirements of Section 82 of the CDT Standard Specifications.

2.03 SIGNS

- A. Sign posts:
 - 1. Sign posts may be reused provided they are sandblasted or repainted to match the condition of new posts.
 - 2. Unless otherwise indicated, new sign posts shall be 2" I.D. standard wall steel galvanized pipe with one end finished to receive mounting cap and fittings.
- B. Concrete for sign post footings: Class B conforming to applicable requirements of Section 90 of the CDT Standard Specifications.
- C. Hardware: Conforming to applicable portions of Section 56 of the Standard Specifications.
- D. Sign panels, unless noted otherwise shall be of reflectorized porcelain enamel. They shall be of the size noted or when not specified they shall be the smallest available size. Submit shop drawings for approval prior to ordering signs.

2.04 PAVEMENT MARKERS AND ADHESIVES

- A. Pavement markers: Section 85 "Pavement Markers". Adhesives shall conform to the provisions of Section 95-2.05 "Standard Set Epoxy Adhesive for Pavement Markers" of the CDT Standard Specifications.

3.00 EXECUTION

3.01 TRAFFIC PAINT AND GLASS BEADS

- A. Types of traffic paint:
 - 1. White:
 - a. Solid 4" line: Edge lines, regular parking stalls, and compact parking stalls.

PAVEMENT MARKING AND ACCESSORIES

- b. Broken 4" line having 9' of stripe and 15' of gap: Travel lanes.
 - c. Solid 12" line: Stop bars and cross walks.
 - d. Pavement markings: Word markings, e.g., STOP, BIKE LANE, and symbolic markings, e.g., TURN ARROWS, HANDICAPPED EMBLEM.
 - e. Solid 8" line: Turn lanes.
 - f. Solid 2" line: Bike lanes.
2. Yellow:
- a. Solid 4" wide double line: Centerline.
 - b. Solid 4" wide lines: Island markings, compact parking stalls and centerline striping.
 - c. Broken 4" line having 9' of stripe and 15' of gap: travel lanes.
3. Blue:
- a. Solid 4" line: Accessible parking stalls.
 - b. Blue curb: Accessible parking stalls.
4. Red:
- a. Red curb, No Parking.
- B. Rates of application:
- 1. New surfaces shall have the traffic paint applied in two applications. The first or priming coat shall be in light applications without glass beads to seal the pavement. The second heavier coat of paint is the wearing surface and the rates of application are shown on Table 1.
 - 2. Restriping where indicated on the drawings, shall coincide with the original painting and shall be applied in one application at the rates indicated in Table 1 (below).
 - 3. Surfaces to be painted shall be clean and dry prior to painting. Allow ample time between the asphalt pavement seal coat and the initial painting application. Usually the drying time of the seal coat is approximately three to four days, depending upon weather conditions. There shall be a minimum drying time between paint applications of approximately 20 minutes.
 - 4. Place glass beads on all traffic stripes and pavement markings except for the first or priming coat on new asphalt surfaces. Rates of application are shown in Table 1

PAVEMENT MARKING AND ACCESSORIES

below. Apply glass beads directly to the wet traffic paint with a method that provides uniform distribution. Do not apply glass beads to paint for parking stripes.

5. TABLE 1-Rates of Application

Solid Strip (4" Wide):

New surface (1st coat) 12-14 gallons per mile or 1 gallon
per 125-150 SF of line.

2nd coat or restriping 16-18 gallons per mile or 1 gallon
per 100-110 SF of line.

Glass beads with 2nd coat Approx. 110 lbs/mile or 6 lbs/gallon of paint.

Pavement Markings:

New surface (1st coat) Approx. 1 gallon per 200 SF of area.

2nd coat or restriping 1 gallon per 100 SF of area.

Glass beads with 2nd coat 6 lbs/gallon paint

6. Provide sufficient evidence to the Engineer that the quantity of paint specified has been applied to the job. Such evidence can be invoice tickets made out to the specific job, counting empty paint cans, or a method acceptable to the Architect.
7. Do not apply striping at temperatures below 40°F or if pavement surfaces are wet.
8. The alignment of striping shall be accurately laid out. Lines which do not conform to the alignment indicated, or which have a wavy appearance, shall be removed and replaced by the Contractor at his expense.

3.02 REMOVAL OF STRIPES

- A. Remove existing stripes and pavement markings by sandblasting. Painting out black paint will not be allowed.
- B. After removal of paint, apply fog seal coat of SS-1h emulsified asphalt per Section 94 of the ACDT Standard Specifications to asphalt surfaces affected by the removal operations. The fog seal coat must be given ample time to dry prior to the initial painting application.

3.03 TRAFFIC CONTROL SIGNS

- A. Install signs in conformance with the Drawings, Details and the CDT Maintenance Manual.

3.04 PAVEMENT MARKERS

- A. Install pavement markers in conformance with the applicable requirements of Section 85-1.06 of the CDT Standard Specifications except that sandblasting shall not be used. Use grinding or other approved methods for cleaning.
- B. Do not install markers on asphalt concrete until at least 14 days after the seal coat has been placed.
- C. Install markers to the lines indicated.

END OF SECTION 32 17 23

**ASBESTOS and PCB ABATEMENT
PROJECT SPECIFICATIONS**

**SUNOL COMMUNITY SCHOOL
1584 NELSON WAY
SAN JOSÉ, CA 95124**

**BUILDING A – BOYS AND GIRLS RESTROOM
MODERNIZATION**

**Prepared for:
SANTA CLARA COUNTY OFFICE OF EDUCATION
1290 RIDDER PARK DRIVE, MC254-B
SAN JOSÉ, CA 95131**

September 27, 2017

HazMat Doc Project # 17-182

**Prepared by:
HAZMAT DOC
3080 OLCOTT STREET • SUITE 135 D
SANTA CLARA, CA 95054
Tel: 408.748.0055**

HazMat Doc

CONTENTS

SECTION 02 82 00 - ASBESTOS ABATEMENT

| SUB-SECTION | | Page No. |
|--------------------|--|-----------------|
| 00 | General Asbestos Removal Specifications | 1 |
| 01 | General Requirements | 8 |
| 02 | Labor, Materials and Equipment | 25 |
| 03 | Execution | 27 |
| 04 | Special Procedures | 39 |
| 05 | Inspections, Project Management, Air Monitoring and Completion | 50 |
| 06 | Alternate Procedures and Violations of Specifications | 56 |
| 07 | Emergency Planning | 57 |
| 08 | Fire Safety and Safe Egress | 58 |

SECTION 02 84 00 - POLYCHLORINATED BIPHENYLS (PCB) AND FLUORESCENT LIGHT BULB/TUBE REMOVAL

| SUB-SECTION | | Page No. |
|--------------------|-----------|-----------------|
| 01 | General | 0 |
| 02 | Products | 4 |
| 03 | Execution | 5 |

APPENDICES

- A. SCOPE OF WORK
- B. ABATEMENT UNIT PRICES
- C. SURVEY ANALYTICAL RESULTS

**SECTION 02 82 00
ASBESTOS-ABATEMENT**

**SUB-SECTION 00
GENERAL ASBESTOS REMOVAL SPECIFICATIONS**

INTRODUCTION

These asbestos removal specifications are necessarily general and are intended only to give a description of what is required to adequately complete an asbestos abatement project. The asbestos abatement project is accompanied by a job-specific SCOPE-OF-WORK (attached as an appendix to this document), which summarizes the procedures, describes the extent and nature of the asbestos removal or abatement, and may detail any special conditions at the job site. These specifications are not intended to cover all variations that may occur, however, a field directive will address unanticipated variations.

TERMS AND DEFINITIONS

The following section is a list of terms and definitions that will be used in this specification.

Abatement: Procedures to control fiber release from asbestos-containing materials (ACM). Includes encapsulation, enclosure and removal.

Accredited: A person who holds a current certificate of training or updated certificate of continuing training as required by Federal and State regulations.

AHERA: The Asbestos Hazard Emergency Response Act of 1986, also referred to as the Asbestos-Containing Materials in Schools; Final Rule and Notice, and 40 CFR Part 763

Asbestos: Means the asbestiform varieties of serpentine, Chrysotile, riebeckite (crocidolite) cummingtonite-grunerite, anthophyllite and actinolite-tremolite

Asbestos-Containing Construction Material (ACCM): Term used by Cal/OSHA to describe construction materials that contain asbestos in amounts greater than one-tenth of one percent (0.1%) either alone or mixed with fibrous or non-fibrous materials..

Asbestos-Containing Material (ACM): Any material or product that contains more than 1 percent (1%) asbestos as determined by Polarized Light Microscopy (PLM) analysis, or assumed to contain greater than 1 percent asbestos.

Airlock: A system for permitting ingress or egress without permitting air movement between a contaminated area and an uncontaminated area, typically consisting of two curtained doorways at least 3 feet apart.

Air Monitoring: The process of measuring the fiber content of a specific volume of air in a stated period of time in an appropriate location.

Ambient Air: The air outside a building or structure OR the air as it normally exists in a space prior to activity

Amended Water: Water to which a surfactant has been added.

Authorized Visitor: Owner, HazMat Project Manager, or representative of any regulatory or other agency having jurisdiction over the project.

Cal/OSHA: California Division of Occupational Safety and Health

Clean Room: An uncontaminated area or room that is part of the worker decontamination unit, with provisions for storage of uncontaminated clothing and equipment.

HazMat Project Manager: An asbestos consulting company and its employees retained by Owner, which employs a full-time HazMat Project Manager who is qualified to perform asbestos consulting services.

Containment: The temporary, polyethylene-lined, enclosure structure erected to control the release of asbestos fibers to the ambient environment.

Contractor: An asbestos abatement contracting company and its employees, which employs a full-time contractor who is certified to provide asbestos abatement services, and whose employees hold current applicable accreditation.

Critical Barrier: A unit of temporary construction that provides the only separation between the asbestos work area and an adjacent area. This includes the decontamination unit, perimeter walls, ceilings penetrations and any temporary barriers between the work area and outside environment.

Curtained Doorway: A device to allow entry or exit from one room to another while permitting minimal air movement between the two rooms, typically constructed by placing two overlapping sheets of polyethylene over an existing or temporary framed doorway, securing the vertical edge of one sheet along one vertical side of the doorway, and securing the vertical edge of the other sheet along the opposite vertical side of the doorway.

CSLB California Contractors State License Board

Decontamination Unit: A series of connected rooms, each room being an airlock, with curtained doorways between any two adjacent rooms, for the decontamination of workers or of materials and equipment.

Demolition: The wrecking or taking out of any non structural building material, casework, surface mounted items or surfaces of a facility together with any related transportation and disposal, and any related razing, removing, or stripping of asbestos products.

Debris Box/Dumpster: Synonymous with waste container. All debris boxes/dumpsters used on this project shall be hard sided including a hard lid, locked at all times when not in use and placed in an owner designated location.

DOP: Dioctylphthalate particles which are used to test the efficiency of HEPA filtration equipment. Substitutes such as Di [2-ethyhexyl] phthalate, PAO (Emery 3004), DOS (Dioctyl-sebacate) may be utilized with prior written permission from the Project Manager.

DOSH: California Department of Industrial Relations, Division of Occupational Safety and Health

Encapsulant : A liquid material that can be applied to ACM or surfaces stripped of ACM and that controls the possible release of asbestos fibers from the material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant). When used, care must be taken that any re-insulation material will adhere to the encapsulant.

Encapsulant (Lock-down) : A liquid designed to mist the air within a containment area after the containment has passed visual clearance by the HazMat Doc Project Manager. Lock-down encapsulant is designed to bind asbestos fibers together and create a sticky surface, allowing asbestos fibers to adhere to it.

Encapsulation: All herein specified procedures necessary to coat surfaces from which ACM has been removed with sealing substance meeting applicable government standards. Encapsulation may also be referred to as "lock-down" encapsulation.

EPA: US Environmental Protection Agency.

Equipment Decontamination Unit: A decontamination unit for materials and equipment, typically consisting of a designated area of the work area, a washroom, holding area, and an uncontaminated area.

Equipment Room: A contaminated area or room that is part of the worker/equipment decontamination unit, with provisions for storage of contaminated clothing and equipment.

Friable ACM: Asbestos-containing material that can be crumbled, or reduced to a powder by ordinary hand pressure, or materials assessed as friable by an accredited asbestos abatement inspector.

Fixed Object: A piece of equipment or furniture in the work area that cannot or will not be removed from the work area, by Owner's decision.

Full Containment/Enclosure: Full containment/enclosures shall be constructed of two layers of 6-mil polyethylene sealing all surfaces, in all locations not being abated during the current phase of abatement. The sheeting must be secured in a manner that shall maintain the integrity of containment throughout removal and testing.

Glovebag Technique: A method with limited applications for removing small amounts of friable asbestos-containing material(s) from ducts, short pipe-runs, valves, joints, elbows and other non-planar surfaces. The glovebag assembly is a manufactured or fabricated device consisting of a glove bag (typically constructed of 6-mil transparent polyethylene or polyvinylchloride sheeting), two inward projecting long sleeves, an internal tool pouch and an attached. Labeled receptacle for asbestos waste. The glove bag is constructed and installed in such a manner that it surrounds the object or material to be removed and contains all asbestos fibers released during the process. Glove bags must meet the specification requirements for glove bags as listed in 8 CCR 1529. All workers who are permitted to use the glove bag technique must be trained, experienced and skilled in this method. All techniques and procedures employed by the contractor shall be approved by the HazMat Doc Project Manager.

HEPA Filter: A High Efficiency Particulate Air (HEPA) filter that traps and retains at least 99.97% of mono-dispersed particles 0.3 microns in diameter or larger.

HEPA-Filtered Exhaust Unit: An exhaust fan that draws contaminated air through a HEPA filter and exhausts the filtered air to the outside of the building.

HEPA-Filtered Vacuum: High efficiency particulate air filtered vacuuming equipment with a filter system that collects and retains 99.97% of mono-dispersed particles 0.3 microns in diameter or larger.

Holding Area: A room between the washroom and an uncontaminated area in the equipment decontamination unit. The holding area has an airlock constructed at its entrance from an uncontaminated area.

HVAC: Heating, ventilation and air conditioning system

Manometer: Instrument for measuring the static air-pressure differential across a barrier. This project requires at least one properly calibrated and fully functional manometer at each containment. Manometer units shall, at a minimum, be factory calibrated once a year.

Mini-Containment/Enclosure: Mini-enclosures may be used where glove bag setups are not feasible. The use of these must be pre-approved by the HazMat Project Manager. Mini-enclosures shall be constructed of 6-mil polyethylene (attached with tape and/or glue to walls and floors) and shall be small enough for a maximum for two workers who can enter the enclosure one at a time, complete the abatement process, pass out the debris (appropriately contained) and exit. The workers shall have available a change room contiguous to the work area where they can remove their coveralls prior to leaving the area.

Monitoring: May include

- (i) Visual inspection for the presence of visible emissions; or
- (ii) Air monitoring performed in accordance with accepted methods;
- (iii) Collecting core samples or encapsulated or bridged materials;
- (iv) Collecting bulk samples of soil during and following abatement;

Moveable Object: A piece of equipment or furniture in the work area that can be removed from the work area.

Non-friable ACM: Asbestos-containing material that does not crumble, or become reduced to powder by ordinary hand pressure, or material that has been assessed as non-friable by an accredited asbestos abatement inspector.

Owner: Individual or entity that owns the property and its employees, representatives or agents.

PLM: Polarized Light Microscopy. Asbestos analysis of bulk material via EPA 600/R-93/116 Method using Polarized Light Microscopy.

Pressure Differential: A condition whereby the containment is maintained at a pressure differential of at least minus 0.02 inches of water relative to the adjacent unsealed areas.

Regulated Area: An area established by a contractor to demarcate areas where airborne concentrations of asbestos exceed, or could potentially exceed, the PEL.

Regulations: ALL relevant Local, State and Federal Regulations

Removal: All specified procedures necessary to strip all ACM from the designated areas and dispose of these materials at an acceptable site.

Renovation: The modifying of any existing structure, or portion (component) thereof.

Scope-of-Work: Project specific removal tasks to be utilized in conjunction with these specifications. If a conflict arises the most stringent requirement shall apply.

Shower Room: A room in the worker decontamination unit that is located between the clean room and equipment room, and is equipped with a functional shower stall with hot and cold water and a waste water filtering system.

Surfactant: A non-toxic, non-flammable, chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

Supervisor: An employee of Contractor who is accredited as a Supervisor for Asbestos Abatement Projects, qualifies as a competent person on asbestos abatement projects, and holds current applicable accreditation.

Structural Member: Any load-bearing member, such as a beam, load-bearing walls or non-load bearing members such as ceilings and non load-bearing walls.

TEM: Transmission Electron Microscopy performed by EPA 40 CFR part 763 Final Rule (AHERA). Per AHERA specifications a Level II analysis on all AHERA jobs.

Visible Emissions: Any emissions, whether containing particulate material or not, that are detectable without the aid of instrumentation. Not including condensed UNCOMBINED water vapor.

Waste Containers: Synonymous with debris boxes/dumpsters. All waste containers used on this project shall be labeled, hard sided including a hard lid, locked at all times when not in use and placed in an owner designated location.

Washroom: A room between the work area and the holding area in the equipment decontamination unit. The washroom has an airlock between it and the holding area.

Wet-Clean: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning tools that have been dampened with amended water, and by afterwards disposing of these cleaning tools as asbestos-containing waste.

Work Area: The area of a building where asbestos-containing materials will be, or are being, removed or abated.

Worker: An individual who has successfully completed and initial US EPA and/or State approved accreditation course and who has maintained that certificate by attending mandated refresher training and possesses valid and current AHERA-accreditation documents.

Worker Decontamination Unit: A decontamination enclosure system for workers, typically consisting of a clean room, a shower room, and an equipment room.

ABBREVIATIONS AND ACRONYMS

The following acronyms or abbreviations as referenced in this contract document are defined to mean these associated names. Both names and addresses are subject to change, and are believed to be, but are not assured to be, accurate and up-to-date as of date of this contract document:

| | |
|----------|---|
| ACM | Asbestos-Containing Materials >1% |
| ACCM | Asbestos Containing Construction Material greater than 1/10 th of 1 percent asbestos (i.e. 0.10% or greater) |
| ACRM | Asbestos-Containing Roofing Materials |
| AHERA | Asbestos Hazard Emergency Response Act; refers to EPA regulation 40 CFR Part 763 entitled "Asbestos-Containing Materials in Schools" in Vol. 52, No. 210, October 30, 1987. |
| AIA | American Institute of Architects |
| ASTM | American Society for Testing and Materials |
| ASHRAE | American Society for Heating, Refrigerating, and Air Conditioning Engineers |
| ASTM | American Society for Testing and Materials |
| Cal-OSHA | California Division of Occupational Safety and Health |
| CFR | Code of Federal Regulations |
| CGA | Compressed Gas Association |
| CS | Commercial Standard of NBS (U.S. Dept. of Commerce) |
| CSLB | Contractors State Licensing Board (California) |
| DOT | U.S. Department of Transportation |
| EPA | U.S. Environmental Protection Agency and by inference the local air pollution control agency or any other entity designated as a representative of the EPA |
| GSA | General Services Administration |
| HEPA | High Efficiency Particulate Air |
| HPM | Hazmat Project Manager |
| HVAC | Heating, Ventilating and Air-Conditioning |
| NBS | National Bureau of Standards |
| NEC | National Electrical Code (by NFPA) |
| NFPA | National Fire Protection Association |
| NESHAPs | National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61) |
| NIOSH | National Institute for Occupational Safety and Health |
| NIST | National Institute of Standards and Technology, U.S. Dept. of Commerce |
| NVLAP | National Voluntary Laboratory Accreditation Program |
| OSHA | Occupational Safety & Health Administration |
| PAT | NIOSH Proficiency Analytical Testing Program |
| PCM | Phase Contrast Microscopy - Analytical Method used to determine airborne concentrations of asbestos fibers according to NIOSH Method 7400 |
| PEL | Permissible Exposure Limit - OSHA allowable 8 hour TWA personal exposure above which employees are required to wear appropriate respiratory and personal protective equipment |
| PLM | Polarized Light Microscopy - Analytical method used to determine asbestos content in bulk material samples. |
| psi | Pressure expressed in pounds per square inch |
| ppm/v | Unit as expressed in parts per million by volume |
| SDS | Safety Data Sheet |
| STEL | Short Term Exposure Limit - OSHA allowable 30 minute TWA personal exposure above which employees are required to wear appropriate respiratory and personal protective equipment |

| | |
|------|---|
| TEM | Transmission Electron Microscopy - Analytical method used to identify and determine airborne concentrations of asbestos fibers according to EPA AHERA protocol. |
| TSCA | U.S. Toxic Substances Control Act of 1976 |
| TWA | Time-Weighted-Average - Average unit of exposure to a substance over a general period of time |
| UL | Underwriters Laboratories |

**SUB-SECTION 01
GENERAL REQUIREMENTS**

1.1 GENERAL

1.1.1 Description Of Work And Contractor Responsibilities

This specification covers removal and disposal of materials identified as Asbestos-Containing Material (ACM) and/or Asbestos Containing Construction Material (ACCM) in independently prepared bulk material analysis reports, and removal and disposal of related materials.

- A. Furnish all labor, tools, materials, equipment, employee training and testing, permits, waste disposal services necessary for and reasonably incidental to the completion of removal and disposal of all Asbestos-Containing Material (ACM) and/or Asbestos Containing Construction Material (ACCM) from within the subject Buildings as denoted in the attached scope of work section of these documents. All work shall be performed in accordance with prevailing Local, State and Federal Regulation, including but not limited to the US Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), the State of California Division of Occupational Safety and Health (DOSH), the State of California Department of Industrial Relations (DIR), the recommendations of the National Institute of Occupational Safety and Health (NIOSH) and any and all other regulations. Where a conflict or overlap of regulations occurs, the MOST stringent shall apply.
- B. The asbestos abatement work as specified herein shall be performed as required to accommodate final aggressive air clearance testing of all interior work sites where standard negative air enclosures have been established, and satisfactory visual inspections for asbestos abatement which takes place on exterior building components. None of the negative air enclosures shall be removed until visual inspections and clearance testing results are satisfactory for the contained work site(s), nor the barricades removed until the final visual inspections are satisfactory for the exterior removal sites inspected.
- C. This is a calendar day contract. Weekends, holidays, etc., are regular working days for the purposes of this contract. The specific daily work schedules and timing for each area of asbestos-containing materials abatement in this project shall be coordinated with, and approved by the HPM, and then specified in the Contractor's asbestos abatement plan, prior to commencing work.
- D. Description of Asbestos-Containing Materials to be removed.
Known ACM/ACCM that must be removed under this contract are listed in the attached Appendix. Determination of the actual quantities of these ACM/ACCM and related ACM/ACCM debris shall be the responsibility of the selected Contractor. In addition to these ACM/ACCM described below, the selected Contractor shall be responsible for the proper abatement of any incidental ACM/ACCM that is necessary to accomplish work of this project. Contractors who chose to submit a bid to perform this work, shall estimate quantities of listed as well as incidental ACM/ACCM by a visual assessment of the ACM/ACCM within the building(s) as illustrated in the attached Appendix.
- E. Quantity of Asbestos-Containing Materials.
The actual determination of quantities and measurements of the asbestos-containing materials, related debris and contaminated materials within this building will be the responsibility of the Contractor. The Contractor shall deal with any encounters of these asbestos-containing materials, related debris and contaminated materials in full accordance with all applicable federal, state and local laws, rules and regulations. All related costs shall be included in the basic contract price. If, during the course of work, the Contractor encounters other materials in these areas or other areas not specified above suspected to contain asbestos, which could require disturbance, clean-up or removal, he shall halt work and immediately notify the HPM for a positive determination of asbestos content and instruction as to procedure.

F. Suspect Asbestos-Containing Materials.

For any types of extensive, non-incident asbestos-containing materials (ACM/ACCM) which are encountered during construction, and which are not specified above, if so directed by the HPM, the Contractor shall remove and dispose of such materials according to the methods specified herein by appropriate change order. All such materials shall be quantified by the HPM and the cost agreed upon by the Contractor and the Owner prior to commencing any asbestos abatement work.

G. Known ACM/ACCM to Remain in Place.

Other ACM/ACCM material may exist in locations not impacted by this scope of work. All ACM/ACCMs in the building(s) may not be designated for abatement and are to remain in their existing condition/location. The Contractor shall secure any known/suspect ACM/ACCM as may be impacted by their activities in the course of accomplishing the existing scope-of-work. The provisions for securing these materials shall be described in the Contractor's abatement plan, and approved by HPM prior to any activity.

H. Construction Schedule.

The construction schedule is attached elsewhere in these documents. The schedule may be corrected by addendum or otherwise in writing by the owner to the contractor. Work shall be accomplished in accordance with this schedule. Any delay in the completion of the work denoted in the attached Scope of Work may subject the contractor to financial and other damages as denoted in the bid section of these documents.

I. Description of Work.

Asbestos abatement work includes the complete and proper removal and disposal of all asbestos-containing materials, related ACM/ACCM debris and contaminated materials within the areas identified and using the procedures specified herein.

J. Description of Work Sites.

For each separately enclosed interior work site, provide a decontamination unit, negative air filtration system, negative pressure monitoring device, and all other requirements of these specifications.

K. Project Conditions.

Specific work areas of the building will not be occupied by the Owner or the general public during the work performed under this contract. The building is to be remodeled and/or renovated. If the Contractor hires any Sub-contractors (Subs) to perform any part of this work, all such Subs shall be notified of the locations of asbestos abatement activities and the schedule of such activities in accordance with these specifications, and as required by OSHA 29 CFR 1926.1101 (k). The Contractor shall coordinate with the Owner all activities such as waste load-out or periods of electrical power outage or usage that could effect nearby work areas or adjacent buildings. Sources for electricity and water will be discussed at the pre-bid conference.

The owner may or may not provide electricity, water and sanitation (toilet) facilities at the owners discretion. It is the contractors' responsibility to furnish all power, water and sanitation requirement for the project. All costs associated with this are to be built in to the contractors base cost.

1.1.2 Related Work

A. Related work includes all work necessary for successful completion of removal and disposal of ACM/ACCM but not directly involving ACM/ACCM. This work includes but is not limited to:

1. Protection of the building and property in the building from work related damage.
2. Proper cleaning and/or disposal of contaminated and non-contaminated materials.

B. Related work includes the maintenance of daily work logs by Contractor on the job site. These work logs shall be supplied to HazMat Project Manager by Contractor and must include:

1. The name of each person, and description of the type of respiratory protection worn by each person entering containment or work area.
2. Descriptions of meetings or discussions regarding the job, special or unusual events, records of daily containment inspections as required by 1926.1101(o)(2), records of waste removal from containment, the chart from the recording manometer, and air monitoring results.
3. HazMat Project Manager shall examine Contractor's daily work log for completeness, and sign each page at the end of each shift.
4. A copy of this daily work log, signed by Supervisor must be submitted to HazMat Project Manager at the end of the project as a condition for completion.

1.1.3 Project Completion

The project shall be deemed complete and Contractor released upon satisfaction of all terms and conditions of this specification, including:

1. All required forms, logs, and receipts and satisfactory completion of air testing and site inspection by HazMat Project Manager.
2. A release letter shall be provided to Contractor by HazMat Project Manager at this time.

1.1.4 Work Schedule

Upon receipt of notification to proceed with a specific project by Owner, Contractor must file all notices to the applicable regulatory agencies, and obtain all required permits to perform the asbestos abatement. Contractor must submit to Owner a notarized affidavit that notifications have been sent to the applicable regulatory agencies, as well as a copy of the notification of asbestos abatement. Upon commencement of work, Contractor must complete the project within the time specified in the schedule.

1.1.5 Contractor Responsibilities

- A. Contractor represents that Contractor and its employees are experts in asbestos removal with full knowledge of, and compliance with, all applicable Federal, State, and Local rules, regulations, and guidelines governing asbestos removal as well as state-of-the-art removal techniques.
- B. Contractor must furnish all permits, labor, material, services, insurance, tools, equipment, and notifications in accordance with EPA, OSHA, State, and all other applicable agencies to complete removal of ACM/ACCM.
- C. Contractor must attend a pre-construction meeting to be held at a mutually agreeable time and date. Attending this meeting will be Owner, Contractor, Supervisor, and HazMat Project Manager.
 1. Abatement Contractor Supervisor assigned to project must attend this meeting.
 2. All pre-construction submittals by Contractor will be reviewed at this meeting. Contractor shall be prepared to discuss and submit plans or documentation for:
 - a. Preparation of work area;
 - b. Personal protective equipment;

- c. Historical air monitoring data that shows levels of airborne fibers on similar jobs in the past;
 - d. Employee training certificates;
 - e. Decontamination procedures;
 - f. Abatement methods and procedures;
 - g. Handling and disposal procedures for ACM/ACCM;
 - h. Final decontamination and cleanup procedures;
 - i. Sequence and schedule of work;
 - j. Emergency procedures;
 - k. Respiratory Protection Program including evidence of respiratory protection training and current respirator fit tests;
 - l. Owner's Safety requirements;
 - m. Any site specific owner requirements;
3. There will be a final walk-through of the building and discussion of plans, anticipated problems, and areas of special concern.
- D. If Owner permits Contractor to use any of its equipment, tools, utilities, or facilities, such use shall be gratuitous and Contractor shall release and hold harmless Owner from any responsibility arising from claims or personal injuries, including death, arising out of the use of such equipment, tools, or facilities irrespective of the condition thereof or any negligence on the part of Owner in permitting its use.
- E. Should Contractor fail or be unable to execute the contract and complete the work for any reason, then Contractor shall be penalized in accordance with agreements stated in contract documents.
- F. Owner retains the right to stop work by and/or dismiss Contractor for any breach of specified procedures, including but not limited to airborne fiber levels exceeding 0.01 fibers/cc outside the containment. Dismissal of Contractor may also result in claims against Contractor in accordance with agreements stated in contract documents.
- G. Inspections: Inspections of work area will be made by HazMat Project Manager at scheduled intervals during the course of the project. It is Contractor's responsibility to ensure that:
- 1. Work area is initially cleaned and properly prepared for removal of ACM/ACCM.
 - 2. Asbestos-containing materials are being properly removed and disposed.
 - 3. Employees of Contractor are properly protected.
 - 4. All asbestos-containing materials have been removed and disposed in accordance with the procedures contained in these specifications and scope-of-work.
- H. The inspections will merely confirm that these conditions have been met. It is the sole responsibility of Contractor to correct any subsequent discoveries of inadequate initial cleaning, preparation, work procedures, or remaining ACM/ACCM encountered after an inspection, regardless of the outcome of such an inspection.

- I. Supervisory Personnel: Contractor must have an accredited Supervisor at each job site at all times, from mobilization to completion. Failure to have a Supervisor present shall result in termination of all asbestos abatement activities for the remainder of the day, or until an accredited Supervisor is again present. Contractor shall not begin work until an accredited Supervisor is present, and shall cease all work when Supervisor leaves the work site.
- J. Security of Containments: Contractor must secure all entrances to containments with a lockable plywood door. The door will be locked with a combination lock. The combination will be given to HazMat Project Manager and Owner's Security Representative. When decontamination units are located on the exterior of buildings, Contractor must cover the exterior portion of decontamination unit with 2" plywood, or suitable optional material to be approved by HazMat Project Manager and Owner.

1.2. SUBMITTALS, NOTICES, RECORDKEEPING, AND REFERENCES

1.2.1 Submittals

Note: At a minimum, the contractor performing any and all work as part of this contract must have a California Contractors State License Board (CLSB) 'B' License Classification or a 'C' License Classification AND must have a CSLB C-22 License AND be a California Department of Industrial Relations, Division of Occupational Safety and Health (DOSH) registered contractor to perform any and all work as part of this contract. Copies of valid and current CSLB licenses and DOSH registration certificate are to be provided by the contractor as part of the pre-job submittal. Contractors having endorsements, riders or qualifiers on any of their licenses such as (but not limited to) 'for bidding purposes only' etc. are ineligible to perform work as part of this contract.

- A. Submit the following to the HPM for approval within Ten (10) days of receiving the "Notice to Proceed" or at least Ten (10) Working Days prior to the start of work. These submittals are in addition to those required in any other section(s) or sub-section(s) of these documents. This document shall be submitted by the contractor performing the work and not by any other. Include at the very least the following:
 - 1. Notifications. All notifications shall be current and valid throughout the duration of the project. Any material changes to the notification, i.e., the quantity of materials being removed, the physical materials being removed, the duration of the project, etc. shall require revisions to the regulatory agencies, with copies provided to the HPM on site. Copies of the written notification and confirmations at least to/from the following regulatory agencies will be required:
 - a. Regional EPA and/or the local Air Quality Management District;
 - b. California Division of Occupational Safety and Health (Cal-OSHA) - Temporary Worksite Notification for Asbestos and Methylenedianiline-related work;
 - c. Air Resources Board Office (*if 1a above is not applicable*);
 - d. Local Authority charged with the responsibility for the enforcement of Occupational Health & Safety, if any (*if 1b above is not applicable*);
 - e. Any other agency as and when necessitated by prevailing regulation(s).
 - 2. Waste Haulers – Copies of :
 - a. Identification of the Waste Hauler(s) for both Hazardous and Non-Hazardous asbestos waste for this Project;
 - b. California Department of Toxic Substances Control (or DTSC) Hazardous Waste Transporter registration for each Waste Hauler;
 - c. California Department of Motor Vehicles (DMV) Motor Carrier Permit for each Waste Hauler;
 - d. U.S. Department of Transportation (DOT) Registration and U.S. Environmental Protection Agency (EPA) acknowledgement of Notification of Hazardous Waste Activity for each Waste Hauler (*only required if waste is to be transported out of State*);
 - e. Statement indicating that all waste generated on this specific site shall be transported by/disposed of by

- licensed, insured and certified personnel/locations;
- f. Statement that the types of Waste Containers being used for this Project will be accepted by the Waste Hauler(s) for the storage and transport of both Hazardous and Non-Hazardous waste.
3. Landfills – Copies of :
- Identification of the Landfill(s) to be used for the disposal of both hazardous and non-hazardous asbestos containing waste generated at the Project site;
 - Permits for the Landfill(s) to be used for the disposal of both hazardous and non-hazardous asbestos waste generated at the Project site;
 - Identification of the Types of Waste accepted at the Landfill(s);
 - Identification of the Types of Waste Profiling required by the Landfill(s);
 - Statement that the types of Waste Containers being used for this Project will be accepted by the Landfill(s) for both hazardous and non-hazardous waste.
4. Licensure:
- Copy of the current California Contractors State Board (CSLB) License (minimum requirement is a Class B License or a Class C License AND a CSLB C-22 License) for any and all contractor(s) or sub-contractor(s) involved in any facet of asbestos related work enumerated as part of this project;
 - Copy of the registration with the Division of Occupational Safety and Health, (Cal/OSHA) endorsement for Asbestos (ASB) work for any and all contractor(s) or sub-contractor(s) involved in any facet of asbestos related work enumerated as part of this project;
NOTE: Contractors having endorsements, riders or qualifiers on any of their licenses such as (but not limited to) 'for bidding purposes only' etc. are ineligible to perform work as part of this contract.
5. Work Plan. A detailed written asbestos work plan including, but not limited to, the following:
- Identification of all Asbestos Scope of Work items that are part of this Project.
 - Identification of entire Work Sequence (schedule) for this Project, including specifics of materials being removed/stabilized and the correlation between work areas and Types of Work (Asbestos, Lead, PCB, etc. as applicable).
 - Identification of abatement duration.
 - Identification of dust control measures.
 - Identification of work area preparation.
 - Identification of construction of decontamination enclosure systems.
 - Identification of demarcation protocols. i.e., installation of barrier tape, barrier fence, asbestos signage, etc.
 - Identification of work area isolation protocols.
 - Identification of Site specific asbestos containing materials removal procedures.
 - Identification of asbestos-containing/contaminated debris cleanup and disposal procedures.
 - Identification of personal protection equipment to be utilized.
 - Identification of waste handling, storage and disposal procedures.
 - Identification of construction of chutes, if required for this project.
6. HEPA Vacuums, HEPA Differential Pressure Unit air filtration devices, HEPA Filters and other local exhaust ventilation equipment. – Copies of :
- Manufacturer's certification that any and all HEPA Vacuums, HEPA Differential Pressure Unit air filtration devices, HEPA Filters and other local exhaust ventilation equipment to be used on this Project conform to ANSI Z9.2-79.
 - Notification that required onsite testing has been scheduled for any and all HEPA Vacuums, HEPA Differential Pressure Unit air filtration devices, etc., to be used on this Project, to ensure that the filtration efficiency meets the criteria for HEPA filtration devices, i.e., 99.97% efficiency at arresting mono-dispersed particulate matter greater than 0.03 micrometers in diameter.

7. SDS– The Contractor shall submit copies of the Safety Data Sheet, fire retardant certification or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for each surfactant, encapsulating material, spray glue, mastic removal agent, plastic sheeting, adhesive/duct tape, etc. or other chemicals/products for use on this Project, including the specific worker protective equipment proposed for use with the material indicated.
8. Personnel Documentation – Copies of :
 - a. Identification of the Project's Asbestos Related Demolition Supervisor/Competent Person who meets the requirements of 29 CFR Part 1926.1101 and 8 CCR Part 1529 and is experienced in administration and supervision of asbestos abatement projects, including work practices, protective measures for building and personnel, disposal procedures, etc.
 - b. Current and complete documentation that the Contractor's employees performing asbestos removal, disposal, etc., operations have received training which meets the criteria of Federal EPA Model Accreditation Plan (40 CFR Part 763, Subpart E, Appendix C). Training certification shall be provided prior to the start of work involving asbestos abatement, for all of the Contractor's workers, forepersons, and Asbestos-Related Demolition Supervisors/Competent Persons. Training shall meet the requirements of 29 CFR Part 1926.1101 and 8 CCR Part 1529 and the criteria of the Federal EPA Model Accreditation Plan (40 CFR Part 763, Subpart E, Appendix C). Training shall be provided prior to the time of job assignment and, at least, annually. Training will be in compliance with all current Cal/OSHA requirements.
 - c. Provide as part of the pre-job submittal a letter from the contractor, signed by a responsible and authorized officer of the contractor's company certifying the following – "This is to certify that all our personnel who may be exposed to airborne asbestos fibers are subject to current and valid medical monitoring in accordance with 29 CFR Part 1926.1101 and 8 CCR Part 1529 and they will receive continued medical surveillance, including monitoring their ability to work while wearing required respiratory protection without suffering adverse health affects as required by 29 CFR Part 1926.1101 and 8 CCR Part 1529 and by state and local regulations pertaining to such work. Furthermore, we certify that all relevant records shall remain valid and current throughout the project and that historical records will be retained by us, in accordance with 29 CFR Part 1926.1101." The contractor may issue this letter and identify and list (by name) all of their employees who will be on site for this project or, alternatively issue an individual letter per employee.
 - d. Current and complete documentation of respirator fit-testing for Contractor employees and agents who must enter the work area. This fit-testing shall be in accordance with qualitative procedures as required by OSHA regulations or be quantitative in nature.
9. Respirators and Filters – Copies of Manufacturer's documentation and certification of NIOSH approvals for respiratory protective devices utilized on site, including manufacturer's certification of NIOSH approval of respirator cartridges (organic vapor, acid gas, mist, dust, high efficiency particulate) and High Efficiency Particulate Air (HEPA) filtration capabilities for all cartridges and filters.
10. Testing Laboratory. Submit the name, address and telephone number of the testing laboratory selected for analyzing personal air monitoring filters along with copies of certification that persons counting the samples have successfully completed NIOSH course #582 or a proven equivalent, that the lab has been judged proficient by successful participation in the National Institute for Occupational Safety and Health (NIOSH) Proficiency Analytical Testing (PAT) Program.
- 11 Site Specific Documentation – Copies of :
 - a. Identification of Work Area(s) at the site;
 - b. Identification of the nearest medical facility and route map/directions to the medical facility;
 - c. Emergency Contact Information and numbers for Emergency services as well as the contractors' emergency contact personnel and information;
 - d. Identification of on-site emergency meeting location;
 - e. Identification and procedure for personnel accounting during an emergency.

12. Contractor General Documents – Copies of :
 - a. General Injury & Illness Prevention Program in compliance with 26 CCR 3203.
 - b. General Emergency Action Plan in compliance with 26 CCR 3220.
 - c. General Fire Prevention Plan in compliance with 26 CCR 3221
 - d. Respiratory Protection Program in compliance with 26 CCR 5144
- B. Hazardous waste manifests, non-hazardous waste data forms, trip tickets and disposal receipts for asbestos waste materials removed from the work area must be received within 24 hours of the transport
- C. Documents to be Provided on-site throughout the duration of the project:
 1. Provide on a DAILY basis, prior to the start of the shift, results from the personal air samples collected during the abatement process of the prior shift.
 2. Provide on a DAILY basis, prior to the start of the shift, copies of the containment entry log pertaining to the abatement process of the prior shift.
 3. Provide on a DAILY basis, prior to the start of the shift, copies of the Manometer logs pertaining to the abatement process of the prior shift.
 4. Copies of Safety Data Sheet (SDS) for solvents, encapsulants, wetting agents, neutralizers and any other chemicals/products used on site and replacement materials, as necessary.
- D. Upon completion of all asbestos abatement activities, submit to the HPM, documentation that includes, without limitation, the following:
 1. Work area entry/exit logbook. The logbook must record the name, affiliation, time in, and time out for each entry into the work site;
 2. Safety Data Sheet (SDS) for solvents, encapsulant(s), wetting agents and replacement materials, as necessary;
 3. OSHA required personal air monitoring results;
 4. Accident/incident reports where injury or damage has occurred on or to the client's property, if any;
 5. Safety Meeting Records;
 6. Daily Reports and Containment Manometer Log(s);
 7. Personnel documents for any and all personnel on site at anytime during the project

1.2.2 Notices to Contractor

The following section contains general notices applicable to Contractor for all asbestos abatement work for Owner.

- A. Employee Behavior
 1. All contractor employees shall be freshly shaved on a daily basis prior to the commencement of each work shift. The Hazmat Project Manager can direct the shift supervisor to have any and all employees removed from the work site if the Hazmat Project Manager determines that employees' facial hair may impede an adequate respirator seal.
 2. Contractor must provide its employees with a written policy of drug and alcohol abuse. No employee of Contractor shall be allowed to remain on Owner's property who is intoxicated by drugs (substance abuse) and/or alcohol, or who is observed using drugs or alcohol on Owner's property.
 3. Contractor is expected to enforce its drug and alcohol abuse policy at all times while conducting business.
 4. Weapons and other hazardous, dangerous, or otherwise disruptive items in the possession of Contractor or its employees are not allowed on Owner's property.

5. Contractor and its employees are required to display good manners to building staff and occupants at all times while on Owner's property. Complaints to HazMat Project Manager or Owner regarding harassment, threatening behavior, poor personal hygiene, or use of profanity or offensive language by any employee of Contractor may result in the suspension of abatement activities until the behavior problem is corrected or employee is removed from owner's property.
- B. Performance Standards:
Contractor shall perform all asbestos removal using techniques and procedures recognized by the asbestos removal industry as being safe and effective in the control of fiber release during removal of ACM/ACCM. Contractor is expected to perform all removal, cleaning, and disposal operations in a manner that would meet final air clearance standards for analysis by Transmission Electron Microscope (TEM).
- C. Pay Requests: All requests for payment by Contractor must be submitted to the owner directly..
- D. Analytical and Test Results
1. Results of bulk sample analyses of ACM/ACCM pertaining to the scope of the asbestos abatement projects are available from Owner or HazMat Project Manager at Contractor's request.
 2. Results of background and previous air monitoring tests made by HazMat Project Manager prior to commencement of work will be available from HazMat Project Manager upon request prior to the beginning of asbestos removal project.
 3. Results of final air tests analyzed by phase contrast microscopy (PCM) will be made available to Contractor within, at least, 24 hours of collection of the sample. Results of final air tests analyzed by transmission electron microscopy (TEM) will be made available within, at least, 48 hours of completion of collection of the sample. HazMat Project Manager will make every reasonable effort to obtain these test results in a time and manner suitable to Contractor's work schedule.
- E. Condition of Building and Fixtures:
Contractor and HazMat Project Manager shall agree in writing on the condition of the building and fixtures, prior to commencement of work. A report on the "Condition of Building and Fixtures" must be signed and notarized by both Contractor and HazMat Project Manager prior to commencement of asbestos abatement. Damages incurred by Contractor must be repaired and/or damaged materials replaced at Contractor's expense.
- F. Royalties and Patents:
All fees, royalties, and claims for any invention, or pretended invention, or patent on any article, material, arrangement, appliance or method that may be used upon or in any manner be connected with the construction of this work or appurtenances are hereby included in the prices stipulated in this contract for said work; Contractor hereby expressly binds himself or itself to indemnify and save harmless Owner from all such claims, fees, and from any and all suits and actions of every name and description that may be brought against Owner on account of any such claims, fees, royalties, or costs for any such invention or patent, and from any and all suits or actions that may be brought against Owner for the infringement of any and all patents or patent rights claimed by any person, firm or corporation.
- G. Indemnification:
Contractor agrees to indemnify, defend, save and hold harmless Owner from all claims, demands, liabilities, and suits of any nature whatsoever to the extent they arise out of, or are due to the negligent or wrongful act or omission by Contractor or its employees.

1.2.3 Record keeping

- A. For each building where ACM/ACCM has been removed, all records concerning removal of asbestos-containing materials shall be kept and a copy of these records given to HazMat Project Manager at the completion of the asbestos removal project. HazMat Project Manager shall submit all documentation to Owner.
- B. For each specific asbestos removal project, Contractor shall provide HazMat Project Manager with a written description of the asbestos removal measure that shall include:
 - 1. Methods used
 - 2. Location of removal project
 - 3. Start and completion dates
 - 4. Names and addresses of all contractors (and subcontractors) involved in the activity
 - 5. State Asbestos Abatement License number
 - 6. The name and location of the disposal site
- C. Furnish to HazMat Project Manager a copy of training records for each person used by Contractor that shall include:
 - 1. The person's name and job title
 - 2. Date of completion of training
 - 3. Location of the training
 - 4. Number of hours of training
- D. For each asbestos removal project, the name, signature, State of accreditation, and accreditation number of each person performing the removal shall be recorded and given to HazMat Project Manager.
- E. For each asbestos abatement project performed for Owner, Contractor shall certify that all asbestos-containing materials related to the scope-of-work have been removed and disposed of in accordance with all applicable federal, regional, state, and local regulations for asbestos abatement.

1.2.4 Applicable Reference Documents

The most recent issue of each document is applicable. In case of overlapping jurisdiction of documents or regulations, the most stringent requirements are applicable.

Applicable Regulations

CODE OF FEDERAL REGULATIONS (CFR)

| | |
|------------------|---|
| 29 CFR 1910 | Occupational Safety and Health Standards for General Industry |
| 29 CFR 1926 | OSHA Construction Standards |
| 29 CFR 1926.1101 | Construction Standard for Asbestos, Tremolite, Anthophyllite & Actinolite |

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

| | |
|-------------------------|---|
| 40 CFR 61 Subpart A & B | General Provisions |
| 40 CFR 61 Subpart M, | National Emission Standards for Hazardous Air Pollutants (NESHAP) |
| 40 CFR 241 | Guidelines for the Land Disposal of Solid Wastes |
| 40 CFR 257 | Criteria for Classification of Solid Waste Disposal Facilities & Practices |
| 40 CFR 260 | Hazardous Waste Management Systems: General |
| 40 CFR 261 | Identification & Listing of Hazardous Waste |
| 40 CFR 262 | Standards Applicable to Generators of Hazardous Waste |
| 40 CFR 263 | Standards Applicable to Transporters of Hazardous Waste |
| 40 CFR 264 | Standards for Owners of Hazardous Waste treatment, Storage & Disposal Facilities |
| 40 CFR 265 | Interim Status Standards for Owners of Hazardous Waste Treatment, Storage & Disposal Facilities |
| 40 CFR 268 | Land Disposal Restrictions |
| 40 CFR 763 | Asbestos-Containing Materials in Schools Rule (AHERA) |
| 40 CFR 763 Subpart G | Worker Protection Rule |

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

| | |
|------------------|-----------------------------------|
| 49 CFR 171 & 172 | Transportation of Hazardous Waste |
|------------------|-----------------------------------|

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) PUBLICATIONS

| | |
|----------|--|
| Z9.2-79 | Fundamentals Governing the Design and Operation of Local Exhaust Systems |
| Z88.2-80 | Practices for Respiratory Protection |

UNDERWRITERS LABORATORIES, INC. (UL) PUBLICATIONS

| | |
|-----------------|---|
| 586-77 (R 1982) | Standard for Test Performance of High-Efficiency Particulate Air Filter Units |
|-----------------|---|

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) PUBLICATIONS

| | |
|----------------|--|
| D 4240 | Guide for Evaluation of Encapsulants for Friable Asbestos and Building Materials |
| D 1331-56(R80) | Surface and Interfacial Tension of Solutions of Surface Active Agents |

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) PUBLICATIONS

| | |
|------------------|---|
| EPA 560/5-85-024 | Guidance for Controlling Asbestos-containing Materials in Buildings |
|------------------|---|

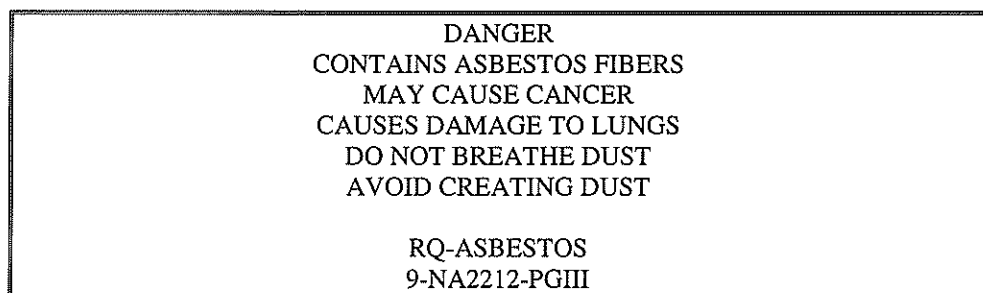
CALIFORNIA CODE OF REGULATIONS (CCR) PUBLICATIONS

Title 8 CCR California Code of Regulations

Title 22 Div 4 Chapter 30 Hazardous Waste Handling

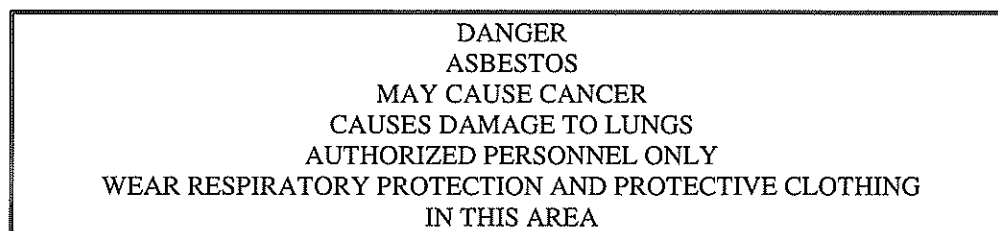
1.2.5 Warning Signs and Labels

- A. Each disposal bag or waste container must be labeled with "Asbestos NA2212," the generator's name and location, and a class 9 label. Disposal bags shall be marked as follows:

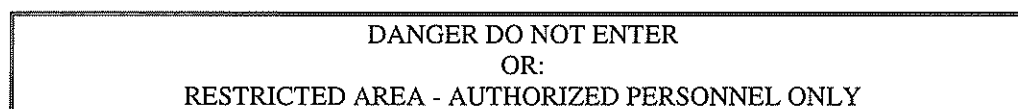


The transport container must have a Class 9 label with the asbestos ID number 2212 in an orange rectangular or white square on point display on all four sides of the container.

- B. Warning signs shall be posted at all entrances to the work area and shall be labeled as follows:



- C. Barrier tape (Caution Tape) shall be placed at all hallways and corridors that lead to the work area and will display the following:



1.3 EQUIPMENT REMOVAL, SITE SECURITY, AND SITE CONDITIONS

1.3.1 Equipment Removal Procedures

Clean external surfaces of contaminated containers and equipment thoroughly by wet-cleaning with sponges, or use HEPA-filtered vacuum before moving such items into equipment decontamination unit washroom for final cleaning and removal to uncontaminated areas. Ensure that personnel do not leave work areas through equipment decontamination unit.

1.3.2 Site Security

- A. Contractor shall provide site security during the hours when Supervisor and workers are on site at no additional cost to Owner. During the hours when Contractor is not on site, Owner will specify the time period during which security shall be required. Contractor may, at Contractor's option, employ a security service, or use employees of Contractor. Owner may, at Owner's option, provide "off-time" site security.
- B. The entrance to the containment must be locked at all times that an employee of Contractor is not present at the entrance. If any windows and/or door are removed as a part of the work assigned to the contractor, it is the contractor's responsibility and at the contractor's expense to secure these areas with plywood (or other acceptable material) door/window covers with locking devices as may be necessary.
- C. When decontamination units are located on the exterior of buildings, Contractor must cover the exterior portion of decontamination unit with 2" plywood, or other suitable material to be approved by HazMat Project Manager and Owner.
- D. Contractor is responsible for all damages to the building or its contents or occupants that result from the operation of Contractor's equipment or personnel within the building, except when specified by HazMat Project Manager or his agent. Damages include, but are not limited to cleanup of any areas contaminated by Contractor during his work and all liquidated damages as stated and agreed to by Owner and Contractor as a result of Contractor's activities.

1.3.3 Site Conditions

- A. Facilities: Domestic power and access to water may not be made available for Contractor's use for the duration of each specific abatement project. If made available and when these utilities are inadequate, Contractor must supply additional utilities. It is the contractor's responsibility to supply power, water and worker sanitation facilities for accomplishing the specified work. The contractor is also responsible for supplying electricity for the monitoring and air clearance equipment utilized by the HazMat Project Manager throughout the duration of the project.
- B. Extent of initial cleaning: When HazMat Project Manager has determined that friable or damaged asbestos-containing materials have contaminated or potentially contaminated equipment and surfaces in the work area, all exposed surfaces in work area that will be protected by fire-retardant polyethylene sheeting shall be thoroughly cleaned with HEPA-filtered vacuums and wet-cleaned prior to installation of fire-retardant polyethylene sheeting over these surfaces.
- C. Equipment storage: Arrangement for equipment storage will be made during pre-construction meeting.
- D. Dumpster location: Arrangements for location of dumpsters to be made at pre-construction meeting. All dumpsters used on asbestos abatement projects for Owner must be secured with locks. Dumpsters must remain locked at all times while present on Owner's property, except when opened to receive waste. All debris boxes/dumpsters used on this project shall be hard sided including a hard lid, locked at all times when not in use and placed in an owner designated location.
- E. Contractor parking: Arrangements for Contractor employee parking to be made at the pre-construction meeting.

1.4 PERSONAL PROTECTION

1.4.1 Personal Protection

- A. Prior to commencement of work, the workers must be instructed, knowledgeable, and accredited by an EPA-approved training facility on the hazards of asbestos exposure, on the use and fitting of respirators, on protective clothing, and on all aspects of work practices and protective measures. This training must comply with all regulations applicable to worker training in the State of California, or State where the work will take place. All workers must have evidence of current accreditation in their possession, or I.D. cards issued by an EPA-approved training agency. Workers having expired accreditation certificates will not be allowed in work area.
- B. In accordance with 29 CFR 1926.150, Contractor shall supply fire extinguishers for use inside and outside the work area. Contractor shall ensure that all employees have been instructed in the general principles of fire extinguisher use and the hazards involved with incipient stage fire fighting.
- C. Respiratory Protection
 - 1. All contractor employees shall be freshly shaved on a daily basis prior to the commencement of each work shift. The Hazmat Project Manager can direct the shift supervisor to have any and all employees removed from the work site if the Hazmat Project Manager determines that employees facial hair may impede an adequate respirator seal.
 - 2. Provide workers with personally issued and marked respiratory equipment approved by NIOSH and suitable for asbestos exposure level in work area.
 - 3. Half-mask, dual cartridge, air purifying respirators must be worn by all personnel during the preparation of work areas having friable ACM/ACCM. Respiratory protection will not be required for preparation of work areas having only non-friable ACM/ACCM (only if a negative exposure assessment for that activity has been determined). Workers may use respiratory protection when not required, if they so desire.
A sufficient supply of respirator filters shall be maintained at the work site to provide new filters to employees, Owner Employees, authorized visitors, and government regulator personnel throughout the duration of the project. Filters shall be replaced according to the manufacturer's recommendations, when breathing becomes difficult, or if the filter becomes wet. At any time during on-site work activity, the contractor shall maintain on-site and readily accessible three (3) new respirators, one in each size, small, medium and large along with the requisite filters/cartridges for the type of work being performed. These respirators will be kept in readiness for the Owner/Owner's representative or any governmental agency representative having jurisdiction over the project. Additionally, the contractor shall make available to HPM two (2) sets of new North™ 7700 Series Respirator Filter Cartridges throughout the duration of the project. These filter cartridges shall be appropriate to the work being conducted on site i.e., P100 HEPA Cartridge and/or stacked P100 HEPA + Organic Vapor Cartridge, etc.
 - 4. If Contractor personnel intend to use a respirator less efficient than a Powered Air Purifying Respirator (PAPR) for removal of friable ACM/ACCM, Contractor must make available air testing results that show that fiber levels for similar work performed in the past were less than 0.1 fibers/cc. When fiber counts in excess of 0.1 fibers/cc are anticipated, PAPR or Type C pressure demand respiratory equipment will be the minimum required respiratory equipment.
 - 5. When respirators with disposable filters are employed, Contractor must provide sufficient replacement filters as required by the worker or applicable regulations.
 - 6. Contractor shall begin removal of friable surfacing or thermal insulation ACM/ACCM with all personnel in work area using PAPR or Type C supplied air respirators unless documentation is submitted to HazMat Project Manager that shows permissible levels of airborne fibers (1.0 fibers/cc or less) on similar jobs in the

past. HazMat Project Manager must approve all documentation in writing, before use of PAPR or Type C respirators can be waived.

7. Unless the Contractor can supply the HPM with acceptable historical personal air monitoring data collected within the last six (6) months for similar ACM (similar asbestos material, mineral composition and concentration), the material being removed utilizing similar techniques, by the same workers; all work under this project, shall commence with all workers utilizing, at a minimum, Powered Air Purifying Respirators (PAPR's). Once the site conditions, work practices and engineering controls being utilized have demonstrated to the satisfaction of the HazMat Project Manager that the average ambient fiber concentration inside the work area, collected over a minimum of two (2) consecutive work shifts, is less than 0.05 fibers per cubic centimeter of air, the HazMat Project Manager may permit the contractors personnel to downgrade to Half-face Negative Pressure Respirators.

In the event that subsequent air monitoring shows an increase in the ambient fiber concentration level at or above 0.05 fibers per cubic centimeter of air, the Hazmat Project Manager will require the use of PAPR's until the conditions listed above have been met.

The minimum respiratory protection throughout the project shall be Half-face Negative Pressure Respirators with a protection factor of ten (10) times the Permissible Exposure Limit.

D. Protective Clothing

1. All employees of Contractor, and authorized visitors are required to wear protective clothing while inside work areas. The protective clothing must be worn properly. No modifications to the clothing may be made that exposes the wearer's skin, other than the hands and face. Protective clothing is to include steel toe safety shoes or rubber boots as applicable, hard hats, eye protection, hearing protection and appropriate gloves.
2. Contractor must provide workers and authorized visitors with sufficient sets of protective full body clothing. Such clothing will consist of protective full body coveralls and headgear. Contractor must provide eye protection and hard hats to all employees and authorized visitors, when required by applicable safety regulations.
3. Non-disposable protective clothing and footwear must be left in equipment room until the completion of the asbestos abatement work. At this time, such items must be disposed of as ACM/ACCM, or must be thoroughly cleaned of all ACM/ACCM. Disposable protective clothing, headgear, and footwear may be provided.
4. The use of canvas or leather footwear is strictly prohibited in contaminated areas or work areas. All authorized personnel must wear rubber boots, or other approved footwear that is easily decontaminated. Footwear must be approved by HazMat Project Manager.

E. Provide and post, in equipment room and clean room, the decontamination procedures, work procedures, and personal protection procedures to be followed by workers, as described in these specifications.

F. Provide and post, in clean room, the a map and clearly marked route of the location of the nearest hospital, telephone, applicable emergency phone numbers, and any other emergency information and procedures for this work.

G. Worker Protection Procedures

1. Each worker and authorized visitor must, upon entering the job site: remove street clothing in clean room and put on a respirator with functional filters and clean protective clothing before entering equipment room or work area. Workers intending to re-wear contaminated protective clothing stored in equipment room must enter

equipment room wearing only respirators (workers will be permitted to wear tight-fitting, nylon swimsuits beneath their protective clothing).

2. Each worker and authorized visitor must, each time he leaves work area:
 - a. Remove gross contamination from clothing with a HEPA-filtered vacuum before leaving work area.
 - b. Proceed to equipment room, remove all clothing except respirators and optional swimsuit, and proceed directly to shower room.
 - c. Wet the outside of the respirator with water while showering.
 - d. Remove the respirator and thoroughly shampoo and wash them.
 - e. If worker intends to change filters, remove filters, wet them, and dispose of them in the container provided for this purpose.
 - f. Wash and rinse the inside of the respirator.
3. After showering, each worker and authorized visitor must:
 - a. Proceed directly to clean room, dry off, and dress in uncontaminated street clothes at the end of each day's work, or before eating, smoking, or drinking.
 - b. Before re-entering work area from clean room, each worker and authorized visitor must put on a respirator equipped with functional filters and must dress in clean protective clothing.
4. Workers intending to re-wear contaminated protective clothing stored in equipment room must enter equipment room wearing only respirators and optional swimwear.
5. Workers removing waste containers from equipment decontamination unit must enter holding area from outside wearing a respirator and dressed in clean protective clothing. No worker shall use this unit as a means to leave or enter washroom or work area.
6. Workers must not eat, drink, smoke, chew gum or tobacco, or apply cosmetics at the worksite except outside the controlled area. Smoking will not be permitted in the School Buildings or on School Property at any time.

H. Type C Air Supplied System

When a Type C Supplied Air System is to be used, the following specifications apply:

1. Grade D Air: Compressed air must be at least Grade D quality. Certification of Grade D air quality must be supplied by an independent testing lab after the system has been installed on site.
2. Compression: When supplied air is required, compressors shall be used throughout removal project to generate the air supply. The following specifications apply to compressor procedures:
 - a. Compressor Shut Down: Interconnect monitors, alarms and compressor so that compressor is automatically shut down and the alarms sounded if any of the following occur:
 - 1) Carbon Monoxide (CO) concentrations exceed 5 ppm/v in the air line between the filter bank and backup air supply,
 - 2) Compressor temperature exceeds normal operating range.

- b. Compressor Location: Locate compressor in a location that will not impede access to the building and that will not cause a nuisance by virtue of noise, exhaust gases, or fumes to occupied portions of the building.
 - c. Air Intake: Locate air intake remotely from any source of automobile exhaust or any exhaust from motors or buildings.
- 3. Purification: Supplied air must be purified using the following system of equipment:
 - a. Aftercooler
 - b. A coalescing filter
 - c. Two adsorption filters consisting of:
 - 1) A molecular sieve to remove water vapor
 - 2) An activated charcoal filter
 - d. A mechanical filter capable of removing particles greater than 10 microns in diameter.
 - e. A carbon monoxide monitor equipped with a visual and audible alarm.
- 4. Storage: Provisions must be made to store a volume of air sufficient for safe exit from work area in the event of compressor failure. Stored air may not be necessary when respirators are equipped with a HEPA egress filter. HEPA egress filters may be used for emergency egress only in asbestos abatement containments.
- 5. Delivery: The air supply system must deliver air at a pressure sufficient to meet the respirator manufacturer's flow requirements. Any air-line respirators chosen must be of the Positive Pressure, Pressure Demand type, and approved by NIOSH. No unapproved respirators may be used at any time. The maximum air-line length must not exceed 300 feet, and maximum inlet pressure at the mask must not exceed 125 psi.
- I. Protection from Heat Stress: In work areas where heat stress to workers is inevitable, such as roofs and hot mechanical rooms Contractor must provide adequate work breaks in cool areas outside work area, and/or body vests with ice pack inserts, depending on the site conditions.

SUB-SECTION 2.0
LABOR, MATERIALS, AND EQUIPMENT

2.1 MATERIALS

- A. Contractor must furnish all labor, materials, equipment, and subcontractors necessary for removal and disposal of ACM in a manner consistent with these specifications. These materials include but are not limited to:
1. Plastic (Polyethylene) Sheeting: Provide 6-mil thickness or greater polyethylene sheeting as specified in sizes to minimize the frequency of joints. Fire retardant polyethylene sheeting is required.
 2. Tape: Provide two inch or wider duct tape capable of sealing joints of adjacent sheets of polyethylene and for attachment of polyethylene sheets to finished or unfinished surfaces of dissimilar materials. Duct tape shall be capable of adhering under both dry and wet conditions, including use of amended water.
 3. Spray Cement: Provide aerosol based spray cement specifically formulated to stick tenaciously to sheet polyethylene.
 4. Surfactant: Provide a 50 percent polyoxyethylene ether and 50 percent polyoxyethylene ester, or equivalent and mix with water to provide a concentration of one ounce surfactant to 5 gallons of water.
 5. Impermeable Containers: Provide impermeable containers suitable to receive and retain any asbestos-containing or contaminated materials until disposal at Disposal Site labeled in accordance with OSHA Regulation 29 CFR 1910.1101, DOT 49 CFR 171-177, Title 8 CCR and BAAQMD. Containers must be both air and watertight and must be resistant to damage and rupture. Plastic bags shall be a minimum of 6-mil thick.
 6. Warning Labels and Signs: Provide warning labels and signs as required by OSHA Regulation 29 CFR Part 1910.1101, Title 8 CCR Part 1529 and the local air pollution agency, as required.
 7. Other Materials: Provide all other materials, such as lumber, nails and hardware, which may be required to construct and dismantle the decontamination area and the barriers that isolate the work area.
 8. Solvents used for the removal of resilient flooring mastics/adhesives shall be low-odor. Regardless of the solvent utilized, the contractor may have the waste profiled for RCRA composition by the HPM – all costs involved with this testing shall be borne directly by the contractor and not by the owner.
- B. Deliver all materials in the original packages, containers, or bundles bearing the name of the manufacturer and the brand name.
- C. Store all materials subject to damage off the ground, away from wet or damp surfaces, and under cover sufficient to prevent damage or contamination.
- D. Damaged or deteriorated materials shall not be used and must be removed from the premises. Material that becomes contaminated with asbestos must be disposed of in accordance with the applicable regulations.

2.2 TOOLS AND EQUIPMENT

- A. Provide suitable tools for asbestos removal, including but not limited to scrapers, brushes, razor knives, wrenches, tools for constructing containment and decontamination units, brooms, carts, and safety equipment.
- B. Provide suitable air moving and exhaust equipment, including but not limited to:
 - 1. A method for maintaining pressure differential of 0.02 inches of water column inside containment than outside.
 - 2. HEPA-filtered vacuums.
 - 3. Recording manometers for monitoring the pressure inside containment relative to outside
 - 4. Portable lighting and power supplies as necessary.
- C. No equipment shall cause suspension of ACM within work area or discharge of asbestos fibers outside of work area.
- D. Electricity, Water and Sanitation Facilities.

ELECTRICITY, WATER AND SANITATION FACILITIES ARE THE CONTRACTORS' RESPONSIBILITY. The owner may or may not provide electricity, water and sanitation (toilet) facilities at the owners discretion. It is the contractors' responsibility to furnish all power, water and sanitation requirement for the project. All costs associated with this are to be built in to the contractors base cost.

Additionally it is the contractors' duty and responsibility to provide the HPM with all their electricity requirements, in each work area, for the HPM to run their air sampling and other equipment. This supply of electricity is to be maintained uninterrupted for the entire duration of the project

SUB-SECTION 3.0 EXECUTION

This section applies to the preparation, removal, cleanup, and disposal of asbestos-containing materials that are friable, non-friable, and mastic materials. Refer to SUB-SECTION 4.0 for SPECIAL PROCEDURES to be used for removal of exterior roofing materials, exterior asbestos cement panels, glove bag removal, mini-containment, and decontamination of contaminated areas.

3.1 PREPARATION

This part is intended to be used as a general specification for preparation of work area for any particular asbestos abatement project for Owner. Consult the Scope of Work for each individual building for more specific preparation requirements.

3.1.1 General and Full Containment Procedures

Proper preparation of the work area prior to asbestos abatement is crucial. The general aspects of preparation of the work area, as required by Owner for this project are discussed below:

- A. **Critical Barriers:** All asbestos abatement work involving friable ACM/ACCM and non-friable ACM/ACCM shall require the installation of critical barriers at all penetrations to the work area. Any and all HVAC vents (supply or return) that are inside the work area shall be sealed with a minimum of two layers of 6-mil polyethylene and tape. Removable components of the HVAC system shall be removed, HEPA Vacuumed and wet wiped prior to being tagged and placed in 6-mil plastic bags and removed from the work area. Removed components shall be stored securely or handed over to the facility manager for eventual re-installation.
- B. **HVAC and Electrical Shut Down:** HVAC systems serving the work area must be either shut down or temporarily capped on all asbestos abatement projects. Electrical systems serving the work area shall be shut down and secured, or special provisions with Owner must be made to ensure the safety of abatement workers while asbestos abatement is performed. All electrical equipment used by Contractor in the work area must be protected by GFI circuits. The electrical supply to the work area must be located outside the containment. All electrical and HVAC system alterations or shut-downs shall be performed in conjunction with and at the direction of the owner, occupant and facility manager.
- C. **Pre-cleaning:** When The HazMat Project Manager has determined that friable or damaged asbestos-containing materials have contaminated or potentially contaminated equipment and surfaces in the work area, Contractor must HEPA vacuum and wet-wipe these items before application of protective covering.
- D. **Polyethylene Sheeting:** In general, all fixed objects and all (*architectural*) surfaces within (*in*) the work area must be protected from contamination during asbestos removal or from damage from application of encapsulants after asbestos removal. In certain instances, the HazMat Project Manager and Owner may not require a covering for walls, floors, or ceilings if the wall, floor, or ceiling material is smooth, non-porous, easily cleaned, and will not be aesthetically affected or damaged by application of amended water and encapsulants.
- E. **Pressure Differential:** All work areas must be placed under a pressure differential of at least minus 0.02 inches of water column, with respect to outside areas, prior to disturbance of asbestos-containing materials. The pressure differential equipment utilized shall be, at a minimum, capable of performing four (4) complete air exchanges per hour. For the purposes of this project, each pressure differential unit shall be evaluated at 75% of the manufacturers rated capacity. For example, if the manufacturers rated capacity for a differential pressure unit is 2,000 cfm., for the purpose of this project, that particular unit will be evaluated as having a maximum capacity of 1,500 cfm. The contractor shall provided the necessary equipment to maintain the required minus 0.02 inches of water column PLUS 20% additional equipment in the event of equipment malfunction work area changes, etc. The unused

equipment shall be tested, installed in the work area, sealed and kept in a state of readiness to be brought on line, if necessary, in a very short period of time.

3.1.2 Preparation for Asbestos Containing Materials / Asbestos Containing Construction Material (ACM/ACCM); Full Containment Procedures

A. Preparation

1. Post warning signs and barrier tape in and around work area as required by all applicable regulatory agencies, and restrict access to work area to personnel approved by Contractor or The HazMat Project Manager.
2. Shut down electric power when necessary. Provide temporary power and lighting and ensure safe installation of temporary power sources and equipment per applicable electric code requirements. Use ground-fault interrupter circuits (GFI) at all temporary power sources in work area. Locate power source for temporary power panels and electrical equipment outside work area. All modifications to the electrical power systems must be performed by a licensed electrician. Additional precautions shall be taken when enclosing live electrical panels or circuit breaker boxes. A rigid enclosure shall be built around the panels and covered with 6-mil plastic with a minimum of 12 inches of clearance or as indicated on the panel. This enclosure shall be kept under positive pressure using a HEPA filter equipped device (i.e., vacuum, differential pressure machine, etc.) to keep the panel adequately ventilated. All electrical panels or breaker boxes inside the work area shall be accessible to the workers within the area and access to them shall not be blocked or restricted. The location and usage of these panels shall form a part of the contractors' emergency plan and shall also be discussed as a part of the periodic site safety meeting. All electrical equipment used within the containment shall be routed through ground-fault interrupter circuits (GFI).
3. Shut down and isolate heating, cooling and ventilating air systems to prevent contamination and fiber dispersal to other areas of the structure. During the work, vents within work area must be sealed with, at least, tape and fire-retardant polyethylene sheeting, unless otherwise indicated in the Scope of Work.
4. Clean supply and return air grilles, remove filters and dispose of filters as ACM.
5. Clean moveable objects and carpeting within the proposed work areas using HEPA-filtered vacuums and/or wet-cleaning methods as appropriate, and remove such objects from work area to a suitable temporary location.
6. Clean fixed objects within the proposed work area using HEPA-filtered vacuums and/or wet-cleaning methods as appropriate, and enclose objects with 6 mil fire-retardant polyethylene sheeting sealed with tape.
7. Clean proposed work areas using HEPA-filtered vacuums or wet-cleaning methods as appropriate. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters must not be used.
8. Seal off all openings, including but not limited to: corridors, doorways, elevators, skylights, ducts, grills, diffusers, and any other penetrations of work areas. Doorways and corridors that will not be used for passage during work must be sealed with critical barriers. These seals must be left in place until final air testing is complete and the results received and approved. The work area may require isolation from occupied areas of the building as determined by the owner and/or the HazMat Project Manager. This isolation may include the construction of rigid or "hard barriers".
"Hard barriers" shall be constructed of wood or metal framing to support barriers in all openings larger than 4 feet by 8 feet. Plywood or drywall sheets shall be affixed to the work side of the barrier. The work area side of the hard barrier shall be covered with a double layer of 6-mil plastic sheeting sealed in place. The other side of the hard barrier shall be covered with a single layer of 6-mil plastic sheeting sealed at the ceiling, walls and floor level. The entire barrier shall be airtight and may be require a "smoke test" to confirm its integrity. Allowances must be made for emergency exits.

9. Cover surfaces in the proposed work area, which do not require asbestos removal, with fire-retardant polyethylene sheeting in the following manner:
 - a. Cover walls or erect temporary walls with 2 layers of (4-mil minimum thickness) fire-retardant polyethylene sheeting sealed with tape. This sheeting must be secured by staples and tension nails as necessary to maintain the integrity of containment throughout removal and testing process. The two layers of fire-retardant polyethylene sheeting must be placed so the upper layer can be removed without damaging the integrity of the lower layer.
 - b. Cover floors with 2 layers of (6-mil minimum thickness) fire-retardant polyethylene sheeting sealed with tape, when appropriate. The floor covering must extend at least 12" up the wall to contain leakage. The wall covering must overlap the floor covering.
 - c. Cover ceilings or erect temporary ceilings with 2 layers of (4-mil minimum thickness) fire-retardant polyethylene sheeting, sealed with tape, when appropriate. This sheeting must be secured in a manner that shall maintain the integrity of containment throughout removal and testing.
 - d. For work areas that do not have an adequately flat surface, or have extensive mechanical and/or electrical fixtures attached to the ceiling, Contractor shall perform initial cleaning of the exposed surfaces at the ceiling prior to removal, and perform wet-cleaning and HEPA-vacuuming during final cleanup. The ceiling area shall be encapsulated prior to final air testing.
10. Cover, isolate, or remove and clean ceiling-mounted objects, such as lights and other items not previously sealed off, or covered, that interfere with asbestos abatement. Use localized water spraying or HEPA-filtered vacuums during fixture removal to reduce fiber dispersal.
11. Maintain marked emergency and fire exits from work areas, or establish alternative exits satisfactory to the fire code.
12. Adequate illumination for the entire work area shall be provided for the entire duration of the project, during the working hours of the project shall be maintained until final clearance results are obtained.
13. The Contractor shall secure all windows and access points to the work area to prevent against break-ins and vandalism.
14. Two (2) Activated Charcoal Filters shall be used on each differential pressure units in the work area. The first of the two Activated Charcoal Filters shall be placed between the pre-filter and the secondary filter on the machine. The second Activated Carbon Filters shall be similar to the secondary air filters employed on the differential pressure units and shall be placed between units' secondary filter and the HEPA filter. All pre-filters, secondary filters and Activated Charcoal Filters shall be replaced on site prior to the commencement of any on-site filter/unit challenge testing.
15. Provide a minimum of two (2) easily accessible view ports to each work area. The view ports shall be a minimum of 18" x 18" clear, see-through plastic or plexiglass with no scratches, tape or glue marks that would impede viewing of the work area from an uncontained area. The contractor shall refer to the owner and/or the on-site the HazMat Project Manager for the location of the view ports. It may be necessary for the contractor to provide additional view ports to ensure that all sections of the work area are visible from an uncontaminated area at all times.
16. Seal all unused elevator doors on floors where work is in progress with fire-retardant polyethylene sheeting and plywood.

B. Decontamination Units

1. Use pre-constructed decontamination units or build suitable framing and line with double layer of fire-retardant polyethylene sheeting sealed with tape at all lap joints in the fire-retardant polyethylene sheeting for all containments and decontamination unit rooms.
2. Construct a worker decontamination unit contiguous to work area consisting of three totally enclosed rooms as follows:
 - a. An equipment room with two curtained doorways, one to work area and one to shower room.
 - b. A shower room with two curtained doorways, one to equipment room and one to clean room. Shower room must contain at least one shower with hot and cold water for each 10 persons in the work area. Water must be mixed at point of use (29 CFR 1910.141).
 - 1) Careful attention must be paid to shower room to insure against leaking of any kind and to insure proper drainage of shower water. There must be no standing water in the shower stall or shower room. Insure a supply of soap, shampoo and clean disposable towels at all times in shower room.
 - 2) Waste water must be filtered through a medium that is capable of removing suspended particles of a diameter greater than or equal to 3 microns. Filtered waste water must be discharged into public sanitary sewer systems. Discharge of filtered water onto surface soil, asphalt, concrete, or any other porous surface shall not be permitted.
 - 3) Permits from local state and federal government agencies, the local water pollution control district, public sanitary sewer entity, etc. will be required on site prior to any filtered waste water being discharged from the work area or the decontamination unit's shower system. Under no circumstances shall waste water (filtered or otherwise) be discharged into a storm water drain or runoff.
 - 4) Filtration devices' filter element or accumulation tank contents shall be removed, manifested and disposed off as friable Asbestos Containing Material at the contractors' expense.
 - c. A clean room with one curtained doorway into shower room and one entrance or exit to non-contaminated areas of the building. Clean room must have sufficient space for storage of the workers street clothes, towels, and other non-contaminated items.
1. When required or directed to by the owner and/or the HazMat Project Manager, provide or construct an equipment decontamination unit consisting of two totally enclosed rooms as follows:
 - a. A washroom, consisting of an airlock, with a curtained doorway to a designated area of work area and a curtained doorway to holding area.
 - b. A holding area, consisting of an airlock, with a curtained doorway to an uncontaminated area.
 - c. When the uncontaminated area is an elevator, a lockable plywood door must also be constructed and placed in front of the elevator door to restrict access to the contaminated areas.
 - d. Worker decontamination unit may be used as an equipment decontamination unit when deemed appropriate by the HazMat Project Manager.

C. Establish Pressure Differential and Ventilation

1. Install HEPA-filtered differential pressure unit in work area to lower concentration of airborne fibers in work area and contain airborne fibers. All differential pressure units shall be challenge tested on site to verify the efficiency of the HEPA Filtration Units to ensure that the units are filtering at a minimum of 99.97% efficiency for mono-dispersed particulate 0.3 micrometers in diameter. Challenge testing shall be performed using DOP or equivalent by persons conversant and experienced in the usage and testing of HEPA filtration units. Testing certificates shall be presented on site to the HazMat Project Manager or affixed to the machines. No differential pressure unit or other HEPA filter equipped equipment shall be used on site until and unless it has been tested and passed this challenge test.
2. All work areas must be placed under a pressure differential of at least minus 0.02 inches of water column, with respect to outside areas, prior to disturbance of asbestos-containing materials. The pressure differential equipment utilized shall be, at a minimum, capable of performing four (4) complete air exchanges per hour. For the purposes of this project, each pressure differential unit shall be evaluated at 75% of the manufacturers rated capacity. For example, if the manufacturers rated capacity for a differential pressure unit is 2,000 cfm., for the purpose of this project, that particular unit will be evaluated as having a maximum capacity of 1,500 cfm. The contractor shall provided the necessary equipment to maintain the required minus 0.02 inches of water column PLUS 20% (or a minimum of one machine – which ever is greater) additional equipment in the event of equipment malfunction work area changes, etc. The unused equipment shall be tested, installed in the work area, sealed and kept in a state of readiness to be brought on line, if necessary, at very short notice.
3. Locate HEPA-filtered exhaust units so that make-up air enters work area through decontamination unit, or other suitable source of make-up air. Place HEPA-filtered exhaust units as far as possible from the entrance/exit or other make-up air sources.
4. Exhaust ducts shall be attached plywood cut-outs and placed through opening window, door, or wall, then sealed with tape and vented to the outside of the building. Exhausts ducts shall not be placed adjacent to ventilation or HVAC units. The plywood cut-outs shall be attached to the building securely to prevent entry, theft or vandalism to the owners' property.
5. Start HEPA-filtered exhaust units prior to removal and continue operating continuously until final air clearance of work area has been successfully obtained.
6. Replace air filters in HEPA-filtered exhaust unit when the unit's manometer indicates that a pressure drop across the filters exceeds 1.0 inch of water, replace pre-filter first, then the secondary filter and finally the HEPA filter.
7. HEPA-filtered exhaust units will be inspected daily by The HazMat Project Manager to ensure proper maintenance, and correct placement of filters. The inspection results will be noted in the HazMat Project Manager's daily logs.
8. Pressure differential recorders (manometers) equipped with an acceptable method of self-recording, i.e., circular recorders, strip charts, print-out, etc. are required in each work area to monitor the pressure difference between the work area and the ambient conditions in the surrounding areas. The recording system shall be accurate to the nearest 0.001 inches of water column differential and be equipped with a functioning audible alarm that sounds if the difference becomes less than minus 0.020-inches water column. The recorders must be calibrated prior to their use and re-calibrated on a daily basis prior to the commencement of the work shift. The daily record produced by the machine is to be marked with the project name, location, date, and time handed over to the HazMat Project Manager or the owners' on-site representative at the conclusion of each work shift.
9. When pressure differential system is shut down at the end of the project, the filters must be left in HEPA-filtered exhaust unit and HEPA-filtered vacuums, and openings on these items must be sealed with polyethylene sheeting and duct tape. Exhaust tubes and vacuum tubes for the HEPA-filtered must be sealed with duct tape in

double bags or 2 layers of fire-retardant polyethylene sheeting. Filters on these pieces of equipment must not be replaced after final cleanup is complete to avoid any risk of re-contaminating the area.

D. Separation of Work Areas from Occupied Areas

1. Maintenance of Containment:

- a. Ensure that barriers and fire-retardant polyethylene sheeting are effectively sealed and taped. Repair damaged barriers and sheeting, and remedy defects immediately upon discovery. Maintenance is to continue until clearance to dismantle containment is given by The HazMat Project Manager.
- b. Supervisor shall frequently inspect containment during each work shift. Any breaks, breaches, delamination of plastic sheeting, etc., shall be repaired instantly.
- c. Monitor effectiveness of barriers with recording manometer. A pressure differential must be maintained at all times, prior to the first disturbance of ACM/ACCM and ending only when final air testing results show that fiber concentrations are acceptable by whichever method has been specified in the SCOPE OF WORK for final air clearance. In the event that pressure differential falls below minus 0.020-inches water column all removal activity in the work area shall cease and the contractor shall devote all resources to tracing and rectifying the fall in pressure prior. Removal shall be suspended until minus 0.020-inches water pressure is restored and permission has been obtained from the HazMat Project Manager to recommence the removal. While pressure is being restored the contractor shall direct that accumulated waste in the work area be bagged and the work area be cleaned.

2. Asbestos abatement work shall not be permitted until:

- a. Documentation for all on-site supervisors and workers has been submitted to, reviewed and accepted by the HazMat Project Manager. Supervisor and worker documents include current training certification(s), current medical surveillance certification and current respirator fit-testing certification. One copy of each of the aforementioned documents is to be submitted to the on site the HazMat Project Manager or their representative along with a copy of the notification to Cal/OSHA and the local air pollution control district, if required. A second copy is to be maintained on-site by the supervisor. It is the supervisors' responsibility to maintain current on-site documentation for all personnel substitutions or alterations.
- b. **All HEPA filter equipped differential pressure units and vacuum cleaners have been challenge tested and passed on site and are certified for use.** Di (2-ethylhexyl) phthalate (DOP, DEHP) POLY-ALPHA OLEFIN (PAO) or an equivalent challenge agent must be used to certify all HEPA filter equipped units.
- c. Arrangements have been made for the transportation and disposal of waste at the selected and approved landfill, as identified in Contractor submittals.
- d. Arrangements have been made to contain, filter or properly dispose of contaminated waste water. Permits from local state and federal government agencies, the local water pollution control district, public sanitary sewer entity, etc. will be required on site prior to any filtered waste water being discharged from the work area or the decontamination unit's shower system. Under no circumstances shall water (filtered or otherwise) be discharged into a storm water drain or runoff.
Waste water must be filtered through a medium that is capable of removing suspended particles of a diameter greater than or equal to 3 microns. Filtered waste water must be discharged into public sanitary sewer systems. Discharge of filtered water onto surface soil, asphalt, concrete, or any other porous surface shall not be permitted.
- e. Decontamination units are in place and the work area is effectively isolated from the remainder of the building.

- f. All other preparatory steps have been taken and applicable notices posted and permits obtained.
- g. Only when all the above conditions have been met will Contractor be allowed to begin the disturbance of any ACM/ACCM. An inspection of each containment by the HazMat Project Manager will be performed prior to the start of removal. Removal shall not be performed until the condition of each containment is approved by the HazMat Project Manager.

3.2. ASBESTOS REMOVAL

This section is intended to be used as a general specification for asbestos removal in work area for any particular asbestos abatement project for Owner. Consult the Scope of Work for each individual building for more specific asbestos removal requirements.

Removal of Vinyl Floor Tile (or equivalent) and/or its associated adhesive/mastic shall be removed by manual means without the use of any electro-mechanical device unless the contractor can prove that it is operationally infeasible to remove the material(s) manually. Infeasible, in this instance, shall not include fiscal or schedule considerations.

- A. For the purposes of these specifications and for this project, the use of mechanical means for the removal of any materials, mastics or adhesives shall render the removal to be construed as that of a friable material. All containment, personnel protection, removal and disposal means, methods, local, state and federal regulations for friable materials removal shall be observed and adhered to. If solvents are used for the removal of mastics, adhesives, etc., in addition to the procedures enumerated herein, all of the solvent manufacturers procedures are also to be followed pertaining to transportation, storage, use, personal protective equipment requirements, disposal, etc. Solvents used shall be low-odor. All solvent waste material shall be placed in impervious barrels prior to being removed from the work area. In the event of a conflict between these specifications and those of the solvent manufacturer's, the more stringent shall apply. Depending on the chemical composition of the materials being removed, and the SDS of the solvent used, the ensuing amalgam of the solvent and the ACM/ACCM containing material may require disposal as a RCRA hazardous waste. Regardless of the solvent utilized, the contractor may have the waste profiled for RCRA composition by the HPM – all costs involved with this testing shall be borne directly by the contractor and not by the owner.

3.2.1 Asbestos Removal, Friable Materials

- A. Prepare site as per section 3.1.1 and 3.1.2. In areas where ACM/ACCM is greater than 2" thick, wetting would begin the day before removal is to take place.
- B. The use of mechanical means for the removal of any material (including but not limited to putty, caulks, mastics, adhesives, etc.) shall render the removal to be construed as that of a friable material under this contract. All containment, personnel protection, removal and disposal means, methods, local, state and federal regulations for friable materials removal shall be observed and adhered to.
- C. Spray asbestos material with amended water using spray equipment capable of providing a mist application to reduce the release of fibers. Saturate friable material sufficiently to wet the substrate without causing excessive wetting, dripping, or delamination of the material.
- D. Spray the asbestos material repeatedly during removal process to maintain wet condition and minimize asbestos fiber dispersion. The spraying must not be used as a technique to remove or dislodge ACM/ACCM.
- E. Remove saturated asbestos material in small sections. As it is removed, the saturated asbestos material shall be packed in plastic bags of 6-mil minimum thickness and placed in appropriately labeled (29 CFR

1926.1101(k)(8)(iii)) container for transport. Fixtures designated for total demolition may be wrapped in double layers of 6-mil plastic, appropriately labeled and placed in labeled containers for transport. The Contractor shall adhere to disposal authorities' size and weight requirements for containers (bags or packages).

- F. If solvents are used for the removal of mastics, adhesives, etc., in addition to the procedures enumerated herein, all of the solvent manufacturers procedures are also to be followed pertaining to transportation, storage, use, personal protective equipment requirements, disposal, etc. Solvents used shall be low-odor. All solvent waste material shall be placed in impervious barrels prior to being removed from the work area. In the event of a conflict between these specifications and those of the solvent manufacturer's, the more stringent shall apply. Depending on the chemical composition of the materials being removed, and the SDS of the solvent used, the ensuing amalgam of the solvent and the ACM/ACCM containing material may require disposal as a RCRA hazardous waste. Regardless of the solvent utilized, the contractor may have the waste profiled for RCRA composition by the HPM – all costs involved with this testing shall be borne directly by the contractor and not by the owner.

G. Waste Load-out Procedure

1. Seal bags or containers. Clean external surfaces of containers thoroughly by wet cleaning in the designated area of work area that is part of equipment decontamination unit.
2. Move containers to washroom, wet-clean each container thoroughly, and move to clean room area pending removal to uncontaminated areas. The material must be placed in a clean bag or container as it exits the equipment washroom and enters clean room area.
3. Ensure that containers are removed from clean room areas by workers who have entered from uncontaminated areas, dressed in clean coveralls. Ensure that workers do not enter from uncontaminated areas into washroom or work area. Ensure that contaminated workers do not exit work area through equipment decontamination unit.
4. When disposal bags are used, the bagged material must be placed within a second bag in the equipment decontamination unit. The second, outer bag must be labeled with all applicable warnings, including D.O.T. labeling. Double bagged material shall then be passed through clean room to a covered cart for removal from the building. When larger pieces of material are to be disposed of, the material must be wrapped in 2 layers of fire-retardant polyethylene sheeting and properly labeled in the equipment decontamination unit.
5. All bags, containers and drums must be tagged with the manifest number and the numbering system provided by Owner, if any.

F. Secondary Removal

2. After completion of gross removal work, all surfaces from which asbestos has been removed must be wet-brushed with a nylon or plastic brush and/or wet-cleaned by an equivalent method to remove all visible material. During this work the surfaces being cleaned must be kept wet.
3. The HazMat Project Manager will individually approve each area of encapsulation prior to commencement of encapsulation.
4. Encapsulant is to be applied only to surfaces from which ACM/ACCM has been removed and the HazMat Project Manager has approved off. Encapsulation is not to be construed as a method for sealing dust on surfaces.

3.2.2 Asbestos Removal, Non-friable Materials

- A. Prepare site as per section 3.1.1 and 3.1.2.
- B. Wet non-friable material with amended water and remove with appropriate equipment. Dispose of material according to waste load-out procedure.
- C. Spray the asbestos material repeatedly during removal process to maintain wet condition and minimize asbestos fiber dispersion. The spraying must not be used as a technique to remove or dislodge ACM/ACCM.
- D. Remove saturated asbestos material in small sections. As it is removed, the saturated asbestos material shall be packed in plastic bags of 6-mil minimum thickness and placed in appropriately labeled (29 CFR 1926.1101(k)(8)(iii)) container(s) for transport. Fixtures designated for total demolition may be wrapped in double layers of 6-mil plastic, appropriately labeled and placed in labeled containers for transport. The Contractor shall adhere to disposal authorities' size and weight requirements for containers (bags or packages).
- E. If solvents are used for the removal of mastics, adhesives, etc., in addition to the procedures enumerated herein, all of the solvent manufacturers procedures are also to be followed pertaining to transportation, storage, use, personal protective equipment requirements, disposal, etc. Solvents used shall be low-odor. All solvent waste material shall be placed in impervious barrels prior to being removed from the work area. In the event of a conflict between these specifications and those of the solvent manufacturer's, the more stringent shall apply. Depending on the chemical composition of the materials being removed, and the SDS of the solvent used, the ensuing amalgam of the solvent and the ACM/ACCM containing material may require disposal as a RCRA hazardous waste. Regardless of the solvent utilized, the contractor may have the waste profiled for RCRA composition by the HPM – all costs involved with this testing shall be borne directly by the contractor and not by the owner.
- F. Waste Load-out Procedure
 - 1. Seal bags or containers. Clean external surfaces of containers thoroughly by wet cleaning in the designated area of work area that is part of equipment decontamination unit.
 - 2. Move containers to washroom, wet-clean each container thoroughly, and move to clean room area pending removal to uncontaminated areas. The material must be placed in a clean bag or container as it exits the equipment washroom and enters clean room area.
 - 3. Ensure that containers are removed from clean room areas by workers who have entered from uncontaminated areas, dressed in clean coveralls. Ensure that workers do not enter from uncontaminated areas into washroom or work area. Ensure that contaminated workers do not exit work area through equipment decontamination unit.
 - 4. When disposal bags are used, the bagged material must be placed within a second bag in the equipment decontamination unit. The second, outer bag must be labeled with all applicable warnings, including D.O.T. labeling. Double bagged material shall then be passed through clean room to a covered cart for removal from the building. When larger pieces of material are to be disposed of, the material must be wrapped in 2 layers of fire-retardant polyethylene sheeting and properly labeled in the equipment decontamination unit.
 - 5. All bags, containers and drums must be tagged with the manifest number and the numbering system provided by Owner, if any.
- F. Secondary Removal
 - 1. After completion of gross removal work, all surfaces from which asbestos has been removed must be wet-brushed with a nylon or plastic brush and/or wet-cleaned by an equivalent method to remove all visible

material. During this work the surfaces being cleaned must be kept wet. After the area has been clean, it shall be vacuumed with a HEPA vacuum prior to the HazMat Project Manager being informed that the area is ready for a visual inspection.

2. The HazMat Project Manager will individually approve each area of encapsulation prior to commencement of encapsulation.
3. Encapsulant is to be applied only to surfaces from which ACM/ACCM has been removed and the HazMat Project Manager has approved off. Encapsulation is not to be construed as a method for sealing dust on surfaces.

3.3 CLEANUP

This part is intended to be used as a general specification for cleanup of work area for any particular asbestos abatement project for Owner. Consult the Scope of Work for each individual building for more specific cleanup requirements.

3.3.1 Cleanup

- A. Remove visible accumulations of asbestos material and debris. Wet-clean all surfaces within work area.
- B. Remove the upper layer of fire-retardant polyethylene sheeting from walls and floors only. The windows, doors, and HVAC vents must remain sealed and any HEPA-filtered exhaust units, air filtration, and decontamination unit must remain in place and in service.
- C. Clean all surfaces in work area and any other contaminated areas with wet-cleaning methods using amended water, and/or using HEPA-filtered vacuums. After cleaning work area, allow for settlement of dust, and again wet-clean or clean with HEPA-filtered vacuums, all surfaces in work area. After completion of the second cleaning operation, perform a complete visual inspection of work area to ensure that work area is free of dust and/or visible asbestos debris.
- D. Time for settlement of dust between initial cleaning and final cleaning will be determined by The HazMat Project Manager. Typical settling times for various types of ACM/ACCM are: 12-16 hours for friable materials, and 3-6 hours for non-friable materials.
- E. Sealed containers and all equipment in use in work area must be included in the cleanup and must be removed from work area via equipment decontamination unit, at an appropriate time in the cleaning sequence.

3.4 INSPECTIONS AFTER REMOVAL

This part is intended to be used as a general specification for inspections of work area for any particular asbestos abatement project for Owner. Consult the SCOPE OF WORK for each individual project for more specific inspection requirements.

3.4.1 Inspections After Removal (see also SUB-SUB-SECTION 5.1)

- A. If the HazMat Project Manager finds visible accumulations of asbestos debris in work area after the completion of step 3.3.1 (C), Contractor shall repeat wet-cleaning until work area is in compliance, at Contractor's expense.
- B. When an inspection by the HazMat Project Manager in the presence of Contractor determines that the area is free of accumulations of dust and visible asbestos debris and the final air clearance has been met, decontamination unit shall be removed, the area thoroughly wet-cleaned, and materials from equipment room and shower room disposed of as contaminated waste.

- C. A final inspection will be carried out by The HazMat Project Manager in the presence of Contractor to ensure that no dust or debris remains on surfaces as a result of dismantling operations.

3.5 DISPOSAL

This part is intended to be used as a general specification for disposal of asbestos-containing materials for any particular asbestos abatement project for Owner. Consult the SCOPE OF WORK for each individual building for more specific disposal requirements.

3.5.1 Disposal

A. Preparation and Security of Waste Holding Areas

1. Prepare enclosed transport vehicles and/or enclosed dumpsters/containers with at least 2 layers of 6 mil fire-retardant polyethylene sheeting. The floor and interior wall surfaces shall be covered with one layer of 6-mil. plastic sheeting sealed with tape to a minimum height of 6 feet above the floor surface or to the roof line of the waste container.
2. Secure transport vehicles and dumpsters with padlocks. Dumpsters/containers and waste transport vehicles must be locked and appropriately labeled at all times while engaged in asbestos disposal on Owner's property, except when waste materials are being loaded into them.

B. Storage and Disposal of Containers

1. Containers of ACM/ACCM shall not be stored in uncontaminated areas, but must be moved directly from work area to a labeled, enclosed dumpster in enclosed carts.
2. ACM/ACCM must be disposed of at the selected and approved disposal site in accordance with requirements of all applicable disposal authorities. Solvents used for the removal of resilient flooring mastics/adhesives shall be low-odor. All adhesives/mastics shall be disposed of as a RCRA waste. Regardless of the solvent utilized, the contractor may have the waste profiled for RCRA composition by the HPM – all costs involved with this testing shall be borne directly by the contractor and not by the owner.
3. Disposal documents and receipts must be submitted to The HazMat Project Manager prior to final clearance of Contractor.

C. Contractor must tag each container with a waste manifest label and a numbering system provided by Owner, if any.

D. Discharge of Waste Water

1. Waste water must be filtered through a medium that is capable of removing suspended particles of a diameter greater than or equal to 3 microns. Filtered waste water must be discharged into public sanitary sewer systems. Discharge of filtered water onto surface soil, asphalt, concrete, or any other porous surface shall not be permitted.
2. Permits from local state and federal government agencies, the local water pollution control district, public sanitary sewer entity, etc. will be required on site prior to any filtered waste water being discharged from the work area or the decontamination unit's shower system. Under no circumstances shall waste water (filtered or otherwise) be discharged into a storm water drain or runoff.
3. Filtration devices' filter element or accumulation tank contents shall be removed, manifested and disposed off as friable Asbestos Containing Material at the contractors' expense.

SUB-SECTION 4.0

SPECIAL PROCEDURES

This section is intended to be used as a general specification for special procedures for any particular asbestos abatement project for The Owner. Contractor should consult the Scope of Work for each individual building for more specific requirements pertaining to this section.

4.1 EXTERIOR ASBESTOS REMOVAL

This part applies only to removal of non-friable exterior roofing materials, non-friable asphalt-based exterior mastic materials, or non-friable exterior asbestos cement panels. Where exterior components have a direct impact on the interior of the buildings or share a common surface with the interior of the building, or in the event of a conflict with interpretation, all procedures enumerated in section 3 of these specifications shall apply.

4.1.1 Personal Protection

- A. Exterior work may be performed using half-mask, dual cartridge, air purifying respirators. Organic vapor cartridges placed in tandem with HEPA filters shall be required when any solvents or materials that produce vapors are used as part of the removal process
- B. All workers engaged in exterior removal must wear disposable full body coveralls, disposable head covers, disposable footwear, hard hats, goggles and gloves as required by OSHA/Cal-OSHA for the complete protection of the workers.
- C. Shoes may be worn for exterior work, provided the shoes are stored in sealed bags at the decontamination area at the end of the day, and properly decontaminated after completion of the work.

4.1.2 Protection from Heat Stress

In exterior areas where heat stress to workers is inevitable, Contractor must provide frequent work breaks in cool areas outside work area, and/or body vests with ice pack inserts, depending on the site conditions.

4.1.3 Decontamination Area

- A. Locate decontamination areas in an exterior or interior area when access from the work area can be accomplished at ground level with exterior access.
- B. Contractor shall establish a decontamination area that is adjacent to the work area for the decontamination of employees and their equipment, which is contaminated with asbestos that consists of an area covered by an impermeable drop cloth on the ground or horizontal working surface.
- C. The area must be of sufficient size as to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area.
- D. Protective clothing must be cleaned with a HEPA vacuum before it is removed.
- E. All equipment and surfaces of containers filled with ACM/ACCM must be cleaned prior to removing them from the equipment room or area.
- F. Contractor shall ensure that workers enter and exit the work area through the decontamination area.

4.1.4 Respirator Decontamination Facilities

A respirator decontamination facility consisting of a water hose equipped with a spray nozzle, an adequate supply of 6 mil bags, and an adequate supply of disposable towels may be used in a remote section of work area so workers may replenish body fluids with Gatorade™, or a similar electrolyte replenishing drink.

- A. Each person who uses the respirator decontamination facility shall rinse the exterior of the respirator while holding head over an open 6 mil bag.
- B. After thoroughly rinsing the respirator each person shall wipe the excess water off the exterior of the respirator with a disposable towel, and dispose of the towel in the bag.
- C. After removing excess water from the exterior of the respirator, the respirator may be removed.
- D. Waste water that has accumulated in the rinse bag shall be disposed of as ACM or properly filtered in the decontamination area.

4.1.5 Exterior Asbestos Removal

- A. Provide suitable tools for removal of asbestos cement panels, roof felts, tar, and mastics. Roof cutters are permissible only when proper steps are taken to ensure dust-free removal conditions, and the building or facility owner, the HazMat Project Manager and local regulatory agencies permit the use of such equipment.
- B. For asbestos cement panels, the perimeter of the work area shall be clearly delineated and labeled with caution tape. Prior to the start of any work prepare the surrounding area by clearing and cleaning all debris and trash to a minimum of 10 feet from the exterior work area. The surrounding areas shall then be covered with one layer of 6-mil plastic sheeting. The plastic sheeting shall be sized so that it will cover a drop area with a minimum of 10 feet from the work area. Spray panels with amended water using spray equipment capable of providing a mist application to reduce the release of fibers. Saturate the material sufficiently to wet the material without causing excess dripping.
- C. Remove wet asbestos cement material in small sections. As it is removed wrap the material in 6-mil fire-retardant polyethylene sheeting and place in appropriately labeled (29 CFR 1926.1101(k)(8)(iii)) containers lined with 6-mil fire-retardant polyethylene sheeting and enclosed truck or closed dumpster for transport.
- D. Asbestos cement panels must be removed carefully and in complete sections. Breakage of the panels must be minimized, and must not be used as a method of removal without prior written approval of the HazMat Project Manager.
- E. For removing roofing material which contains ACM/ACCM Contractor shall ensure that the following work practices are followed:
 - 1. The perimeter of the building shall be clearly delineated and labeled with caution tape. Prior to the start of any work on the roof, prepare the surrounding area below by clearing and cleaning all debris and trash to a minimum of 15 feet from the exterior walls of the building. The surrounding areas shall then be covered with one layer of 6-mil plastic sheeting. The plastic sheeting shall be sized so that it will cover a drop area with a minimum of 15 feet from the exterior wall. The interior of the building shall be appropriately and adequately protected from debris that may fall through the roof decking during removal.
 - 2. Roofing material shall be removed in an intact state to the extent feasible.
 - 3. Wet methods shall be used to remove roofing materials that are friable, or that will be rendered friable during removal, unless such wet methods are not feasible or will create safety hazards.

4. Cutting machines, if permitted for use, shall be continuously misted during use, unless a competent person determines that misting substantially decreases worker safety.
 5. When removing built-up roofs with asbestos-containing roofing felts and an aggregate surface using a power roof cutter, all dust resulting from the cutting operation shall be collected with a HEPA-filtered dust collector, or shall be HEPA vacuumed by vacuuming along the cut line.
 6. When removing built-up roofs with asbestos-containing roofing felts and a smooth surface using a power roof cutter, if permitted for use, the dust resulting from the cutting operation shall be collected either by a HEPA dust collector or HEPA vacuuming along the cut line, then carefully and completely wipe up the still-wet dust and debris left along the cut line.
- F. Asbestos-containing material that has been removed from a roof shall not be dropped or thrown to the ground. Unless the material is carried or passed to the ground by hand, it shall be lowered to the ground via covered, dust-tight chute, crane or hoist:
1. Any ACM/ACCM that is not intact shall be lowered to the ground as soon as is practicable, but in any event no later than the end of the work shift. While the material remains on the roof it shall either be kept wet, placed in an impermeable waste bag, or wrapped in plastic sheeting.
 2. Intact ACM/ACCM shall be lowered to the ground as soon as is practicable, but in any event no later than the end of the work shift.
- G. Upon being lowered, unwrapped material shall be transferred to a closed receptacle in such manner so as to preclude the dispersion of dust.
- H. Roof level heating and ventilation air intake sources shall be isolated after these ventilation systems have been shut down.
- I. After completion of removal work, all surfaces from which asbestos has been removed must be wet-cleaned, and the entire surface must be vacuumed with a HEPA-filtered vacuum.
- J. Any adhesive materials such as mastic, asphalt, or tar must be removed using a suitable (non-toxic) solvent. The residue must be bagged and properly disposed of as ACM. On porous or irregular surfaces where all traces of ACM/ACCM cannot be removed, encapsulant may be applied. Prior to encapsulation, however, these areas must be inspected and approved by the HazMat Project Manager.

4.2 GLOVE BAG PROCEDURE

The glove bag is a specialty procedure that shall be utilized only when specified in the SCOPE OF WORK of these specifications. Glove bag procedures may only be performed when access and preparation limit possibilities for removal. The procedure shall only be utilized when circumstances dictate this type of removal, as determined by The HazMat Project Manager.

4.2.1 Personal Protection

- A. The glove bag procedure may be performed using half-mask, dual cartridge, air purifying respirators, provided Contractor shows previous, similar work has not produced airborne fiber levels in excess of 0.01 fibers/cc during the glove bag removal procedure. If the contractor cannot produce the required negative exposure assessment, the HazMat Project Manager may require the contractor's personnel to utilize Powered Air Purifying Respirators (PAPR's).

- B. All workers engaged in exterior removal must wear disposable full body coveralls, disposable head covers, disposable footwear, hard hats, goggles and gloves as required by OSHA/Cal-OSHA for the complete protection of the workers.
- C. Shoes may be worn for exterior work, provided the shoes are stored in sealed bags at the decontamination area at the end of the day, and properly decontaminated after completion of the work.

4.2.2 Preparation for Glove Bag Procedure

- A. Post warning signs and barrier tape in and around work area as required by all applicable regulatory agencies, and restrict access to work area to personnel approved by The HazMat Project Manager.
- B. Shut down electric power when necessary. Provide temporary power and lighting and ensure safe installation of temporary power sources and equipment per applicable electric code requirements. Use ground-fault interrupter circuits (GFIC) at power receptacles in work area.
- C. Seal vents within work area with, at least, tape and fire-retardant polyethylene sheeting during the work.
- D. Cover moveable objects within the proposed work areas using 6-mil fire-retardant polyethylene sheeting, as appropriate, or remove such objects from work area to a suitable temporary location.
- E. Cover areas beneath and adjacent to the proposed work using 6 mil fire-retardant polyethylene sheeting, as appropriate. Cover scaffolding with at least one layer of 6 mil fire-retardant polyethylene sheeting, when appropriate.
- F. Prepare curtained doorways at entrances to and exits from work area.

4.2.3 Decontamination Room or Area

- A. Contractor shall establish an equipment room or area that is adjacent to the glove bag work area for the decontamination of workers and equipment contaminated with asbestos. The decontamination area shall consist of an area covered by an impermeable drop cloth on the floor or horizontal working surface, and be of sufficient size as to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area.
- B. Workers may use double suits, or decontaminate a single suit with a HEPA-filtered vacuum. Before leaving work areas each worker must remove and dispose of the outer suit (if double suits are used) and dispose of this suit in a suitable container (see **SUB-SUB-SECTION 3.5.1, DISPOSAL**), or thoroughly vacuum the suit using a HEPA-filtered vacuum (if single suits are used) before leaving the glove bag work area to enter decontamination room or area.
- C. All equipment and surfaces of containers filled with ACM/ACCM must be cleaned prior to removing them from the decontamination room or area.
- D. Contractor shall ensure that employees enter and exit the regulated glove bag work area through the decontamination room or area.

4.2.4 Separation of Work Areas from Occupied Areas

A. Maintenance of Critical Barriers

1. Ensure that barriers and fire-retardant polyethylene linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery. Maintenance is to continue until clearance to remove critical barriers is given by the HazMat Project Manager.
2. Supervisor shall visually inspect critical barriers continually for the duration of each work shift.

B. Asbestos abatement work shall not begin until:

1. Documentation for all on-site supervisors and workers has been submitted to, reviewed and accepted by the HazMat Project Manager. Supervisor and worker documents include current training certification(s), current medical surveillance certification and current respirator fit-testing certification. One copy of each of the aforementioned documents is to be submitted to the on site the HazMat Project Manager or their representative along with a copy of the notification to Cal/OSHA and the local air pollution control district, if required. A second copy is to be maintained on-site by the supervisor. It is the supervisors' responsibility to maintain current on-site documentation for all personnel substitutions or alterations.
2. All HEPA filter equipped differential pressure units and vacuum cleaners have been DOP tested and passed on site and are certified for use.
3. Arrangements have been made for the transportation and disposal of waste at the selected and approved landfill, as identified in Contractor submittals.
4. Decontamination units are in place and the work area is effectively isolated from the remainder of the building
5. All other preparatory steps have been taken and applicable notices posted and permits obtained.
6. Only when all the above conditions have been met will Contractor be allowed to begin the disturbance of any ACM/ACCM. An inspection of each containment by the HazMat Project Manager will be performed prior to the start of removal. Removal shall not be performed until the condition of each containment is approved by the HazMat Project Manager.

4.2.5 Asbestos Removal

- A. Install glove bag according to manufacturers recommendations, and in accordance with 29 CFR 1926.1101(g)(5)(ii).
- B. Cut covering on insulation along the top seam to allow wetting of the insulation, and cut cover all around section to be removed.
- C. Remove ACM/ACCM in small sections. Lower the insulation carefully in the bottom of the glove bag. Do not drop material. One glove bag must be used for each section of ACM/ACCM to be removed. Sliding or re-use of a single glove bag is strictly prohibited. Use appropriate size bag for the dimensions of the material to be removed to ensure economy of materials.
- D. Prior to removal of the glove bag, ensure that all surfaces from which asbestos has been removed are clean of all visible material, and that the upper portion of the bag is clean of all visible waste. Spray all surfaces and tools in the glove bag with amended water. Wipe all sections of pipe with rag or appropriate material. Wipe upper section of bag as well.

- E. Use appropriate encapsulant on all surfaces inside the bag. Cover exposed insulation remaining on pipes with wettable fiberglass or other suitable material. Duct tape is not suitable for this purpose.
- F. Place tools inside sleeves of glove bag and isolate from interior of glove bag. Collapse bag using HEPA-filtered vacuum. Squeeze and twist bag at mid-level to isolate waste from upper portion of bag. Seal bag with duct tape or locking ties. Vacuum the unsealed upper portion. Keep the HEPA-filtered vacuum connected until the glove bag is removed. Cut the glove bag along the top and sides, then remove from pipe. Cut off isolated sleeves containing any tools or supplies from the bag and place in bucket of water. Clean the tools in equipment room of decontamination unit. Place the glove bag inside a 6-mil waste bag and seal the top of the waste bag by "goose necking" it and sealing it with duct tape.
- G. Disposal of glove bag, material, and wastewater (see **SUB-SUB-SECTION 3.5.1 DISPOSAL**).

4.3. MINI-CONTAINMENT PROCEDURE

The mini-containment may be specified in certain instances, such as removal of ACM/ACCM from a small ventilation system or from a short length of duct where a glove bag may not be appropriate to adequately contain the asbestos fibers during removal. The procedure shall only be utilized when circumstances dictate this type of removal, as determined by the HazMat Project Manager.

4.3.1 Personal Protection

- A. The mini-containment procedure may be performed using half-mask, dual cartridge, air purifying respirators, provided Contractor shows previous, similar work has not produced airborne fiber levels in excess of 0.01 fibers/cc during mini-containment removal procedures in the past. If the contractor cannot produce the required negative exposure assessment, the HazMat Project Manager may require the contractor's personnel to utilize Powered Air Purifying Respirators (PAPR's).
- B. All workers engaged in exterior removal must wear disposable full body coveralls, disposable head covers, disposable footwear, hard hats, goggles and gloves as required by OSHA/Cal-OSHA for the complete protection of the workers.
- C. Shoes may be worn for this work, provided the shoes are stored in sealed bags at the decontamination area at the end of the day, and properly decontaminated after completion of the work.

4.3.2 Preparation for Mini-Containment Procedure

- A. Post warning signs and barrier tape in and around work area as required by all applicable regulatory agencies, and restrict access to work area to personnel approved by The HazMat Project Manager.
- B. Shut down electric power when necessary. Provide temporary power and lighting and ensure safe installation of temporary power sources and equipment per applicable electric code requirements. Use ground-fault interrupter circuits (GFIC) at all power receptacles in work area. Locate power source for electrical equipment outside work area.
- C. Seal off all openings, including but not limited to: vents, ducts, grills, diffusers, and any other penetrations of work area within mini-containment with, at least, tape and fire-retardant polyethylene sheeting.
- D. When appropriate, clean moveable objects within the proposed work areas using HEPA-filtered vacuums and/or wet-cleaning methods as appropriate, or remove such objects from work area to a suitable temporary location.
- E. When appropriate, clean fixed objects within the proposed work area using HEPA-filtered vacuums and/or wet-cleaning methods as appropriate, and cover objects with 6 mil fire-retardant polyethylene sheeting.

- F. Construct mini-containment using a single layer of fire-retardant polyethylene sheeting placed over a temporary frame constructed with 2"x 4" lumber, PCV tubing or other suitable material, as determined by the HazMat Project Manager. When permanent walls are present, and will suffice for containment barriers, cover walls and ceilings with a single layer of fire-retardant polyethylene sheeting.
- G. Construct a decontamination room contiguous to the mini-containment consisting of a single layer of fire-retardant polyethylene sheeting attached to 2"x 4" lumber, PCV tubing or other suitable material, as determined by the HazMat Project Manager. The decontamination room shall be of sufficient size as to accommodate cleaning of equipment and removing personal protective equipment, and shall have curtained doorways at the entrance to work area and exit to uncontaminated areas.
- H. Place HEPA-filtered vacuum or low-volume HEPA-filtered exhaust unit in such a manner that a pressure differential can be established in the change room.
- I. Doorways and corridors outside the mini-containment that will not be used for passage during work must be barricaded with barrier tape.

4.3.3 Decontamination Room or Area

- A. Contractor shall establish an equipment room or area that is contiguous with the mini-containment work area for the decontamination of workers and equipment contaminated with asbestos. The decontamination area shall consist of an area covered by a impermeable drop cloth on the floor or horizontal working surface, and be of sufficient size as to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area.
- B. Workers may use double suits, or decontaminate a single suit with a HEPA-filtered vacuum. Before leaving work areas each worker must remove and dispose of the outer suit (if double suits are used) and dispose of this suit in a suitable container (see **SUB-SUB-SECTION 3.5.1, DISPOSAL**), or thoroughly vacuum the suit using a HEPA-filtered vacuum (if single suits are used) before leaving the decontamination room.
- C. All equipment and surfaces of containers filled with ACM/ACCM must be cleaned prior to removing them from the decontamination room or area.
- D. Contractor shall ensure that employees enter and exit the regulated mini-containment work area through the decontamination room or area.

4.3.4 Separation of Work Areas from Occupied Areas

- A. Contractor shall ensure that barriers and fire-retardant polyethylene linings are effectively sealed and taped. Damaged barriers shall be repaired and defects remedied immediately upon discovery. Maintenance is to continue until clearance to remove mini-containment is given by The HazMat Project Manager.
- B. Asbestos abatement work shall not begin until:
 1. Arrangements have been made for disposal of waste at the selected and approved landfill, as identified in Contractor submittals.
 2. Mini-containment and decontamination unit are in place and work area is effectively isolated from the remainder of the building.
 3. All other preparatory steps have been taken and applicable notices posted and permits obtained.

4. Only when all the above conditions have been met will Contractor be allowed to begin disturbance of ACM/ACCM. An inspection of the mini-containment by the HazMat Project Manager will be performed prior to the start of removal. No removal shall be performed until the condition of the mini-containment is approved by the HazMat Project Manager.

4.3.5 Asbestos Removal

- A. Mist materials with amended water and remove materials in small sections. Place in bag immediately.
- B. Wipe down exposed surfaces with amended water and rags.
- C. Seal bags or containers. Clean external surfaces of containers thoroughly by wet-cleaning in the mini-containment.

4.3.6 Waste Load-out Procedure

See SUB-SUB-SECTION 3.2.1, PARAGRAPH E, WASTE LOAD-OUT PROCEDURES, STEPS 1-5.

4.3.7 Cleanup and Encapsulation

- A. After completion of removal work, all surfaces from which asbestos has been removed must be brushed and/or wet-cleaned by an equivalent method to remove all visible material. During this work the surfaces being cleaned must be kept wet with solvent, unless otherwise noted in the Scope of Work
- B. The HazMat Project Manager will individually approve each area for encapsulation in writing prior to commencement of encapsulation.
- C. Encapsulant is to be applied only to surfaces from which ACM/ACCM has been removed and shall not be used as a method for sealing dust on surfaces.

4.4 DECONTAMINATION OF CONTAMINATED AREAS

In the event that an area of a building is determined by the HazMat Project Manager or The Owner as being contaminated with asbestos dust or debris, the area must be decontaminated using the procedures included in this part of the specification.

4.4.1 Personal Protection

- A. All personnel entering an area that is visibly contaminated with assumed, suspected, or known ACM/ACCM must wear half-mask, dual cartridge, air purifying respirators and protective clothing to install temporary barriers and begin preparation of the contaminated area.
- B. When area or personal air samples indicate a level of airborne fibers to be in excess of 0.1 fibers/cc, all personnel in the contaminated area must use PAPR until fiber concentrations are consistently measured below 0.1 fibers/cc.
- C. When area or personal air samples indicate a level of fiber concentrations to be in excess 1.0 fibers/cc, all personnel in the contaminated area must use a PAPR or Type C, pressure demand respirator until fiber concentrations are measured below 1.0 fibers/cc.
- D. All personnel entering the contaminated area must wear protective clothing and use decontamination units upon leaving the contaminated area.

4.4.2 Preparation

- A. Immediately shut down and isolate heating, cooling and ventilating air systems to prevent contamination and fiber dispersal to other areas of the structure. Adequately wet all visible asbestos debris in the contaminated area. Cover vents within the contaminated area with tape and fire-retardant polyethylene sheeting.
- B. Seal off contaminated area with temporary barriers constructed with 6-mil fire-retardant polyethylene sheeting. Construct curtained doorway for temporary access to contaminated area.
- C. Construct a worker decontamination unit contiguous to the contaminated area consisting of three totally enclosed rooms as follows:
 - 1. An equipment room with two curtained doorways, one to the contaminated area and one to shower room.
 - 2. A shower room with two curtained doorways, one to equipment room and one to clean room. Shower room must contain at least one shower with hot and cold water. Water must be mixed at point of use (29 CFR 1910.141)
 - a. Careful attention must be paid to shower room to insure against leaking of any kind and to insure proper drainage of shower water. There must be no standing water in the shower stall or shower room. Insure a supply of soap at all times in shower room.
 - b. Waste water must be filtered through a medium that is capable of removing suspended particles of a diameter greater than or equal to 3 microns. Filtered waste water must be discharged into public sanitary sewer systems. Discharge of filtered water onto surface soil, asphalt, concrete, or any other porous surface shall not be permitted. Permits from local state and federal government agencies, the local water pollution control district, public sanitary sewer entity, etc. will be required on site prior to any filtered waste water being discharged from the work area or the decontamination unit's shower system. Under no circumstances shall waste water (filtered or otherwise) be discharged into a storm water drain or runoff.
 - 3. A clean room with one curtained doorway into shower room and one entrance or exit to uncontaminated areas of the building. Clean room must have sufficient space for storage of the workers street clothes, towels, and other uncontaminated items.
- D. Seal off all openings, including but not limited to: corridors, doorways, elevators, skylights, ducts, grills, diffusers, and any other penetrations to the contaminated areas. Doorways and corridors that will not be used for passage during work must be sealed with barriers. These seals are barriers critical to the integrity of containment and must be left in place until final air testing is complete and the results received and approved.

4.4.3 Establish Pressure Differential

- A. Install HEPA-filtered differential pressure unit in work area to lower concentration of airborne fibers in work area and contain airborne fibers. All differential pressure units shall be challenge tested on site to verify the efficiency of the HEPA Filtration Units to ensure that the units are filtering at a minimum of 99.97% efficiency for mono-dispersed particulate 0.3 micrometers in diameter. Challenge testing shall be performed using DOP or equivalent by persons conversant and experienced in the usage and testing of HEPA filtration units. Testing certificates shall be presented on site to the HazMat Project Manager or affixed to the machines. No differential pressure unit or other HEPA filter equipped equipment shall be used on site until and unless it has been tested and passed this challenge test.
- B. All work areas must be placed under a pressure differential of at least minus 0.02 inches of water column, with respect to outside areas, prior to disturbance of asbestos-containing materials. The pressure differential equipment utilized shall be, at a minimum, capable of performing four (4) complete air exchanges per hour. For the purposes of

this project, each pressure differential unit shall be evaluated at 75% of the manufacturers rated capacity. For example, if the manufacturers rated capacity for a differential pressure unit is 2,000 cfm., for the purpose of this project, that particular unit will be evaluated as having a maximum capacity of 1,500 cfm. The contractor shall provided the necessary equipment to maintain the required minus 0.02 inches of water column PLUS 20% (or a minimum of one machine – which ever is greater) additional equipment in the event of equipment malfunction work area changes, etc. The unused equipment shall be tested, installed in the work area, sealed and kept in a state of readiness to be brought on line, if necessary, at very short notice.

- C. Locate HEPA-filtered exhaust units so that make-up air enters work area through decontamination unit, or other suitable source of make-up air. Place HEPA-filtered exhaust units as far as possible from the entrance/exit or other make-up air sources.
- D. Exhaust ducts shall be attached plywood cut-outs and placed through opening window, door, or wall, then sealed with tape and vented to the outside of the building. Exhausts ducts shall not be placed adjacent to ventilation or HVAC units. The plywood cut-outs shall be attached to the building securely to prevent entry, theft or vandalism to the owners' property.
- E. Start HEPA-filtered exhaust units prior to removal and continue operating continuously until final air clearance of work area has been successfully obtained.
- F. Replace air filters in HEPA-filtered exhaust unit when the unit's manometer indicates that a pressure drop across the filters exceeds 1.0 inch of water, replace pre-filter first, then the secondary filter and finally the HEPA filter.
- G. HEPA-filtered exhaust units will be inspected daily by The HazMat Project Manager to ensure proper maintenance, and correct placement of filters. The inspection results will be noted in the HazMat Project Manager's daily logs.
- H. Pressure differential recorders (manometers) equipped with an acceptable method of self-recording, i.e., circular recorders, strip charts, print-out, etc. are required in each work area to monitor the pressure difference between the work area and the ambient conditions in the surrounding areas. The recording system shall be accurate to the nearest 0.001 inches of water column differential and be equipped with a functioning audible alarm that sounds if the difference becomes less than minus 0.020-inches water column. The recorders must be calibrated prior to their use and re-calibrated on a daily basis prior to the commencement of the work shift. The daily record produced by the machine is to be marked with the project name, location, date, and time handed over to the HazMat Project Manager or the owners' on-site representative at the conclusion of each work shift.
- I. When pressure differential system is shut down at the end of the project, the filters must be left in HEPA-filtered exhaust unit and HEPA-filtered vacuums, and openings on these items must be sealed with polyethylene sheeting and duct tape. Exhaust tubes and vacuum tubes for the HEPA-filtered must be sealed with duct tape in double bags or 2 layers of fire-retardant polyethylene sheeting. Filters on these pieces of equipment must not be replaced after final cleanup is complete to avoid any risk of re-contaminating the area.

4.4.4 Decontamination of Contaminated Surfaces

- A. Clean moveable objects and carpeting within the contaminated areas using HEPA-filtered vacuums and/or wet-cleaning methods as appropriate, and remove such objects from the contaminated area to a suitable temporary location. Refer to SUB-SECTION 5.4(B) for Re-establishing object and systems.
- B. Clean fixed objects, including ceiling and wall fixtures, within the contaminated area using HEPA-filtered vacuums and/or wet-cleaning methods as appropriate.
- C. Clean all exposed surfaces in the contaminated area using HEPA-filtered vacuums or wet-cleaning methods as appropriate. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters shall not be used.

SUB-SECTION 5.0

INSPECTIONS, PROJECT MANAGEMENT, AIR MONITORING AND COMPLETION

5.1 INSPECTIONS

This section is intended to be used as a general specification for inspections, air monitoring, and completion for any particular asbestos abatement project for the owner. Consult the Scope of Work for each individual building, for more specific requirements pertaining to this section, if any.

5.1.1 Inspections Prior to and During Work

- A. Contractor shall make all work areas available to inspection throughout the project.
- B. Each work area will be inspected by HazMat Project Manager accompanied by Contractor:
 - 1. Immediately after initial cleaning has been completed and prior to the application of fire-retardant polyethylene sheeting to exposed surfaces.
 - 2. Immediately prior to the commencement of removal of ACM/ACCM (after preparation of work area is complete).
 - 3. Periodically throughout the project.
 - 4. After removal is complete but prior to the application of any encapsulant to the exposed substrates, and pre-encapsulation air testing.
- C. Regular inspections of the HEPA-filtered ventilation system will be performed by HazMat Project Manager to ensure filters are excessively loaded with particulate debris, and are properly seated in HEPA-filtered exhaust units. If deemed necessary by the HazMat Project Manager, the contractor will be required to change the filters.

5.1.2 Inspection of Non-asbestos Containing Materials

HazMat Project Manager may inspect all materials from work area that are being disposed of as Non-asbestos Containing Materials.

5.1.3 Final Visual Inspections

- A. A final visual inspection will be made after all Contractors' materials have been removed from work area and all removal, encapsulation, disposal, and related work is completed.
- B. Work area must be well lighted for inspection by HazMat Project Manager. Insufficient lighting may result in delay of the final visual inspection.
- C. All fire-retardant polyethylene sheeting must be removed from work area, with the exception of critical barriers, and decontamination unit. HEPA-filtered exhaust units must remain operational, and pressure differential maintained until final clearance by TEM or PCM is obtained.

5.2 PROJECT MANAGEMENT

5.2.1 Project Management

- A. The owner will employ HazMat Project Manager to conduct on-site Project Management for all phases of the asbestos abatement work.
- B. HazMat Project Manager will be responsible for:
 - 1. Approval of all submittals by Contractor, including pay requests.
 - 2. Conducting all inspections at the job site, as required. Monitoring job site performance and progress.
 - 3. Performing all personal, area, and final air testing throughout the course of each project. Personal testing by the HazMat Project Manager will be for the owners use and records only. The contractor is responsible for collecting all personnel samples as may be required by these specifications, local, state and federal regulations, etc.
 - 4. Submitting final report to the owner that will include all documents, logs, charts, photographs, and test results pertaining to each project.

5.3 AIR MONITORING

5.3.1 General

- A. The Asbestos Contractor is responsible for the personal air sampling. All other air sampling will be performed by HazMat Project Manager. Personal, area, and pre-encapsulation air samples will be analyzed by an NVLAP-accredited laboratory using NIOSH method 7400 using phase contrast microscopy (PCM) or by an individual possessing a valid NIOSH-582 equivalency qualifications. If deemed appropriate by the HazMat Project Manager, PCM may be used for final air testing.
- B. Final air samples will be analyzed by a laboratory accredited by NVLAP for Transmission Electron Microscopy (TEM), using the AHERA Mandatory Transmission Electron Microscopy Method in Appendix A of 40 CFR 763, subpart E.

5.3.2 Background Air Testing

- A. Background Air Testing will be carried out by HazMat Project Manager prior to initiation of work by Contractor in order to establish background levels of contamination.
- B. If air monitoring, during work by Contractor, shows an increase in airborne fiber concentrations outside containment system, work shall cease until the source of the contamination is found and remedied to HazMat Project Manager's satisfaction. Any areas that have been contaminated as a result of Contractor's work shall be cleaned by Contractor at his expenses and without impact to the schedule agreed to by the owner and the contractor.
- C. Background air samples will be analyzed by PCM. TEM analysis of questionable samples will be made available at the expense of Contractor should he request it. All such requests are to be made in writing.

5.3.3 Personal Air Sampling

- A. The personal air monitoring will consist of:

1. An 8 hour Time Weighted Average (TWA) for samples collected on 25% of the work force during each eight hour shift for the duration of the project.
2. Continuous personal monitoring to be conducted during preparation, removal, and final cleanup, unless Type C pressure demand respiratory protection is used.
3. Excursion Limit or Short Term Exposure Limit (STEL) sampling shall be performed during all phases of the asbestos abatement project to establish the STEL for each job function. The STEL shall be for a duration of 30 minutes and be collected midway through the work shift.
4. All personal air samples shall be analyzed by NIOSH method 7400 (PCM) or NIOSH method 7402 (TEM) only.

5.3.4 The Pre-encapsulation Test

- A. After successful completion of the pre-encapsulation inspection, but prior to removal of the wall and floor coverings, critical barriers, decontamination unit, and use of any encapsulant, HazMat Project Manager may conduct pre-encapsulation air testing.
- B. This will consist of filtered air samples of sufficient volume to yield a detection limit of less than 0.01 fibers/cc.
 1. The sampling will not begin until work area is dry.
 2. Sampling will utilize aggressive techniques (a 1 HP leaf blower and electric fans) to re-suspend any dust or material that has settled in work area.
 3. The pre-encapsulation air testing will be analyzed by PCM (NIOSH 7400) with a concentration of 0.01 fibers/cc being acceptable (see **SUB-SUB-SECTION 5.3.6** for discussion of confidence limits).

5.3.5 Conditions for Final Air Testing

- A. Final air testing shall take place when removal is complete, the fire-retardant polyethylene sheeting not necessary to the integrity of containment removed, and a visual inspection of work area shows that work area is clean and dry.
- B. Contractor should expect a delay of at least 24 hours from the time the samples reach the laboratory to the time the results are known for all PCM analyses. HazMat Project Manager will make every reasonable effort to obtain these results in a time period suitable to Contractor's work schedule.
- C. Contractor should expect at least a 48 hour delay from the time the samples reach the laboratory to the time the results are known for samples analyzed by TEM. HazMat Project Manager will make every reasonable effort to obtain these results in a time period suitable to Contractor's work schedule.

5.3.6 Air Clearance Criteria

- A. HazMat Project Manager and Contractor recognize the samples taken for all PCM clearance or pre-encapsulation samples must meet a standard that allows HazMat Project Manager 95% certainty that the sample does not in fact meet the 0.01 fibers/cc final air standard. Ninety-five percent certainty is defined by the equation:

$$MC + 1.645 (CV) (FAS) = 95\% \text{ confidence level}$$

where:

MC = measured concentration of fibers

CV = coefficient of variation

FAS = final air standard

- B. The results of this equation must be less than the final air standard for any sampled area to pass the test.
- C. For samples analyzed by the Transmission Electron Microscope Method, the arithmetic mean of the measured airborne asbestos concentration for the five inside samples must be less than or equal to 70 structures per square millimeter (70 s/mm²).

5.3.7 Final Air Testing

- A. After work area has met the 0.01 fibers/cc standard for the pre-encapsulation test (if performed), final air testing will be conducted and analyzed by Transmission Electron Microscopy (TEM), when the amount of ACM/ACCM removed in work area is greater than 160 square feet, or 260 linear feet. Final air testing will consist of five TEM samples inside work area the arithmetic mean of the measured airborne asbestos concentration for the five inside samples must be less than or equal to 70 structures per square millimeter (s/mm²). The sampling procedures and guidelines in EPA 40 CFR 763 part III will be followed.
- B. When the amount of ACM/ACCM removed in work area is less than 160 square feet or 260 linear feet, the results of the pre-encapsulation (PCM) air test will be considered as the criteria for Contractor compliance, unless TEM analysis is required by the owner.
- C. The HazMat Project Manager shall, after evaluation site conditions and at his/her discretion chose and perform the appropriate air testing.

5.3.8 Final Air Testing: Exterior Areas

Final air testing may not be required for exterior, open work areas. Instead, a thorough and meticulous inspection will be performed by HazMat Project Manager to determine Contractor compliance.

5.3.9 Final Air Testing: Glove Bag Procedure

- A. Each work area in which glove bag removal has occurred shall be visually inspected by HazMat Project Manager prior to final air testing.
- B. Aggressive sampling procedures will not be used unless work areas are fully contained by critical barriers.
- C. Each work area may be tested and analyzed by the PCM method, using static sampling procedures, unless conditions allow aggressive testing (see B. above).
- D. A TEM final air test of the general areas of glove bag removal may be performed at the owner's discretion upon failure of a PCM final.

5.3.10 Failure of Final Air Tests

- A. When the results of the final air test show values of airborne asbestos in excess of the final air standard, Contractor must re-clean work area.
- B. The final air testing procedure shall then be repeated at Contractor's expense. This shall include, but not be limited to, the sampling and analysis costs for the monitoring air samples during re-cleaning and the final air clearance, HazMat Project Manager's costs and expenses, any and all contractual penalties, liquidated damages, etc., levied by the owner and/or other trades that may be impacted by the change in schedule.

5.3.11 Availability of HazMat Project Manager

- A. The HazMat Project Manager will be on-site or on-call and available within 2 hours at all times.
- B. Contractor must notify HazMat Project Manager of the work schedule both at the start of the job and on a daily basis.
- C. Departures from this schedule may result in charges for waiting or unnecessary site visits and shall be charged to Contractor.
- D. Calls that require HazMat Project Manager to work overtime are subject to the approval by the owner.

5.4 COMPLETION

5.4.1 Completion

- A. Completion Criteria
 1. After final inspections and final air testing are complete and the results known, HazMat Project Manager will advise Contractor of the test results.
 2. When a work area fails either the inspection or the final air testing, the area must be re-cleaned, re-inspected and re-tested. The sequence of re-cleaning and re-testing shall continue until the area passes the inspection and the final air test. Refer to paragraph 5.3.10 *et seq.* above for additional information.
 3. When work area has passed final air test, Contractor will be informed immediately.
 4. The contractor shall remove all plastic sheeting, critical barriers, decontamination units, etc. All plastic sheeting, and other consumables shall be disposed of as asbestos contaminated waste.
- B. Re-establishment of Objects and Systems

When the project is complete:

1. Relocate all objects moved to temporary locations in the course of the work to their former positions.
2. Where HVAC, mechanical, and electrical systems have been shut down or disconnected, restore these systems to proper working order.
3. Any areas or finishes where damage may have occurred by the actions of the contractor including, but not limited to tape, staples, nails, spray-poly, water damage to Ceiling, Wall and Floor finishes Furniture and Fixtures, Exterior Areas – landscaping, shrubbery, trees, pots, ornaments, etc. shall be restored to their original condition by the contractor at his expense and without adversely impacting the schedule for the project. All restoration shall be to the satisfaction of the owner. The owner reserves the right to withhold payment for the lack of restoration of any property destroyed or damaged by the contractor.
4. Submit to the HazMat Project Manager or his designee the contractors “close out” submittal to included, all manifests, waste hauler trip tickets, work area entry and exit logs, personnel air monitoring sample results, differential pressure recorders print-outs/charts, accident reports if any or a confirmation statement from the site supervisor stating that there were no accidents on this project, a confirmation statement from the site supervisor enumerating the type, location quantity of asbestos containing material removed throughout this project, etc.

SUB-SECTION 6.0

ALTERNATE PROCEDURES AND VIOLATIONS OF SPECIFICATIONS

This section is intended to be used as a general specification for alternate procedures for all projects for Owner. Consult the specific scope-of-work sheet, for each individual building, for more specific requirements pertaining to this section, if any.

6.1 Alternate Procedures

- A. Procedures described in this specification must be utilized at all times.
- B. When specific procedures cannot be utilized, a request must be made in writing to HazMat Project Manager providing details of the problem encountered and recommended alternatives.
- C. Alternative procedures must provide equivalent or greater protection than procedures that they replace.
- D. Any alternative procedure must be approved in writing by HazMat Project Manager prior to implementation.

6.2 Violations of Specifications

- A. Owner will enforce these specifications through HazMat Project Manager.
- B. HazMat Project Manager/Owner shall issue cease work orders upon discovery of any violation of these specifications.
- C. Minor infractions of the specifications may result in cessation of work until the infraction is corrected.
- D. Major violations of this specification may result in the dismissal of the contractor from all asbestos abatement work, and application of liquidated damages as stated and agreed to by Contractor in contract documents.

SUB-SECTION 7.0

EMERGENCY PLANNING

- A. Emergency planning must be developed by Contractor and approved by Owner and HazMat Project Manager.
- B. Emergency procedures must be in written form and prominently posted in clean room and equipment room of worker decontamination unit. Prior to entering work area everyone must read and sign these procedures to acknowledge receipt and understanding of work site layout, location of emergency exits, and emergency procedures.
- C. Emergency planning must include:
 - 1. Written notification of police, fire and emergency medical personnel of planned abatement activities, work schedule, and layout of work area.
 - 2. An employee safety meeting must be conducted by Contractor prior to the commencement of each work shift. The meeting shall be attended by all Contractor employees on site, and HazMat Project Manager. All aspects of emergency planning shall be covered in the meeting.
 - 3. Access to fire extinguishers both inside and outside the work area.
- D. Emergency planning must include:
 - 1. Considerations of fire, explosion, toxic atmospheres, electrical hazards, slips, falls and trips, confined spaces and heat related injury.
 - 2. A copy of the emergency procedures and evidence employee training in these procedures shall be provided to Owner.
- E. Evacuation and Emergency Decontamination Procedures
 - 1. Employees must be trained in evacuation procedures in the event of workplace emergency.
 - 2. For non-life threatening situations, employees injured or otherwise incapacitated must decontaminate following normal procedures, with assistance from fellow workers if necessary, before exiting the workplace to obtain proper treatment.
 - 3. For life-threatening injury or illness, worker decontamination shall take least priority after measures to stabilize the injured worker, remove him from the workplace and secure proper medical treatment.
- F. Telephone numbers of all emergency response personnel must be prominently posted in the clean room and equipment room, along with the a map of, and clearly marked route to, the location of the nearest hospital emergency room.

SUB-SECTION 8.0

FIRE SAFETY AND SAFE EGRESS

8.1 FIRE PROTECTION AND PREVENTION

8.1.1 Fire Protection Program

- A. Contractor shall be responsible for the development of a fire protection program to be followed throughout all phases of demolition and abatement work, and shall provide firefighting equipment as specified in this section.
- B. As fire hazards occur, there shall be no delay in providing the necessary equipment.

8.1.2 Fire Extinguishers

- A. Contractor shall provide a fire extinguisher, rated not less than 2A, for each 3,000 square feet of demolition/abatement work area.
- B. Travel distance from any point of the protected area to the nearest extinguisher shall not exceed 100 linear feet. This distance shall decrease in areas of limited mobility.
- C. A fire extinguisher may be substituted with a 2" diameter garden hose not exceeding 100 linear feet in length.

8.1.3 Sprinkler Systems

- A. During renovation, abatement, or alterations, the existing fire sprinkler system shall be maintained in service at all times.
- B. If building is scheduled for complete demolition, existing sprinkler system shall be retained in service as long as reasonable.

8.1.4 Fire Alarm Devices

An Alarm System consisting of an active telephone system and warning alarm (e.g. siren) shall be established by Contractor to alert workers and fire department in case of fire emergency.

8.2 SAFE EMERGENCY EGRESS

8.2.1 Application

This part contains general fundamental requirements essential to providing a safe means of egress from fire and similar emergencies. Nothing in this part shall be construed to prohibit a better type of containment construction, more exits, or otherwise safer conditions than the minimum requirements specified in this part.

8.2.2 Fire Alarm Facilities

- A. In each work area, provide fire alarm facilities to workers and other building occupants so they may escape.
- B. These fire alarm facilities shall be provided where necessary to warn worker and building occupants of the existence of fire, as a fire itself may not provide adequate warning.

8.2.3 Protection of Workers and Building Occupants

- A. No existing building shall be occupied during demolition/abatement unless all existing exits and any existing fire protection are continuously maintained, or in lieu thereof, other measures are taken to provide equivalent safety.
- B. No flammable or explosive substances or equipment for demolition/abatement shall be introduced in a building of normally low or ordinary hazard classification while building is occupied, provided the condition of use and safeguards do not create any additional danger or handicap to egress beyond the normally permissible conditions in the building or work area.
- C. Each exit, way of approach, and way of travel from an exit to the street or open space shall be continuously maintained free of all obstruction or impediments to instant use in the case of fire or other emergency.

8.3 MEANS OF EGRESS

8.3.1 Definitions

- A. Exit Access: That portion of a means of egress that leads to an entrance to an exit.
- B. An Exit: That portion of a means of egress that is separated from all other spaces of demolition /abatement or equipment as a way of travel to the street or open area.
- C. High Hazard Contents: High hazard contents shall be classified as those materials, substances, or equipment that are able to rapidly burn or from which toxic gases, fumes, or explosions may occur in the event of fire.

8.3.2 Means of Egress

- A. If a door is present at the exit to the decontamination unit, from a work area to an exit, or to a way of exit access, it shall be of the side-hinged, swinging type. It shall swing in the direction of exit travel.
- B. The minimum width of any way of exit access shall in no case be less than 28 inches. Where a single way of exit access leads to an exit, its capacity in terms of width shall be at least equal to the required capacity of the exit to which it leads. Where more than one way of exit access leads to an exit, each shall have a width adequate for the number of persons it must accommodate.

8.3.3 Emergency Exits

- A. For each work area, Contractor shall provide an alternate emergency exit.
- B. The alternate emergency exit shall consist of a door that leads to a way of exit access. The door shall be covered and sealed with fire-retardant polyethylene sheeting.
- C. Fire-retardant polyethylene sheeting covering the emergency exit shall be clearly outlined and attached in a manner that allows "tear away" in case of emergency and marked as an emergency exit. A utility knife shall be permanently attached to the fire-retardant polyethylene sheeting to provide access to the emergency exit.
- D. Contractor shall install arrows throughout the work area at 2 feet and 5 feet above the floor indicating the direction to the nearest exit.

8.3.4 Emergency Lighting

- A. In case of electrical failure during fire, Contractor shall provide battery-operated lights or lamps in the work area.
- B. There shall be at least one battery-operated light or lamp for every five workers present in the work area.

SECTION 02 84 00

POLYCHLORINATED BIPHENYLS (PCB) AND FLUORESCENT TUBES REMOVAL

PART 1 GENERAL

1.01 DESCRIPTION

The work of this section consists of furnishing all transportation, labor, materials, equipment and incidentals necessary to legally handle and dispose of offsite all Polychlorinated Biphenyl (PCB) containing materials (fluorescent light ballasts), fluorescent tubes containing mercury vapor, and other hazardous materials.

1.02 SCOPE OF WORK

- A. The Contractor is responsible for the removal, handling, transport, and proper disposal of PCB-containing materials including fluorescent light ballasts. The Contractor shall inspect remaining fluorescent light fixtures, remove all ballasts which are not marked "Non-PCB containing" or "No PCBs", package, and dispose of in accordance with the requirements identified in this section.
- B. The Contractor is responsible for the removal, handling, transport, and disposal of fluorescent tubes containing mercury vapor. Contractor shall remove, package and dispose of all remaining fluorescent light tubes in accordance with the requirements of this section.

1.03 RELATED WORK

- A. SECTION 02 82 13 – ASBESTOS ABATEMENT WORK
- B. SECTION 02 83 00 – LEAD-RELATED DEMOLITION WORK

1.04 APPLICABLE DOCUMENTS AND REGULATIONS

- A. It is the responsibility of the Contractor to know the current regulations controlling work and to perform all related work in accordance with such regulations that provide for worker and public safety against asbestos exposure.
- B. The publications listed below form a part of this specification to the extent referenced. The current issue of each document shall govern. Where conflict among requirements or with these Specifications exists, the more stringent requirements shall apply.

CODE OF FEDERAL REGULATIONS (CFR)

| | |
|-----------------|--|
| 40 CFR 761 | Polychlorinated Biphenyl (PCBs) Manufacturing, Processing, Distribution in Commerce and Use Prohibitions |
| 29 CFR 1910.134 | Respiratory Protection |
| 29 CFR 1910.145 | Accident Prevention Signs and Tags |
| 40 CFR 178 | Shipping Container Specification |

AMERICAN NATIONAL STANDARD INSTITUTE (ANSI) PUBLICATION

Z88.2-69 Practices for respiratory protection

UNDERWRITERS LABORATORIES, INC.

UL 586 1990 High-Efficiency Particulate Air Filter Units

1.05 DEFINITIONS

- A. "Polychlorinated Biphenyls (PCBs)" as used in this specification shall mean the same as PCB Article, PCB Article Container, PCB Container, PCB Equipment, PCB Item, PCB Transformer, PCB Contaminated Transformer, as defined in 40 CFR 716.3.
- B. "Leak or leaking" means any instance in which a PCB Article, PCB Container, or PCB Equipment has any PCBs on any portion of its external surface.
- C. "Spill" means intentional and unintentional spills, leaks, and other uncontrolled emissions resulting in any quantity of hazardous material being released to the environment.
- D. "Control Area" means a restricted area posted with the proper warning/caution signs in which only trained persons may enter.
- E. "High Efficiency Particulate Air (HEPA) Filters (for PCB dust)" means a filter capable of removing 99.97% of the particles down to 0.3 microns (Φ) in diameter and consistent with a UL 586 filter system.
- F. "Mercury Filter" means a special mercury filter cartridge carrying proper test and certification approval number for mercury vapor work.
- G. "Other Hazardous Materials and Potentially Hazardous Materials" means all hazardous materials or potentially hazardous materials not otherwise defined in this specification as Asbestos, Chlorofluorocarbons (CFCs), Polychlorinated Biphenyls (PCBs), Fluorescent Tubes, Mercury, or Lead Based Paint shall be considered as Other Hazardous Materials and Potentially Hazardous Materials.
- H. Hazmat Project Manager (HPM) means the on-site representative from HazMat Doc. The HPM is also one of the owner's representatives.

1.06 QUALITY ASSURANCE

- A. Training: Instruct employees on the dangers of mercury vapor, PCB, and other hazardous materials exposure, on respirator use, decontamination, and applicable OSHA and EPA regulations.
- B. Regulation Documents: Maintain at all times one copy each at the office and one copy each in view at the job site of the approved Contractor's Removal, Storage, and Disposal Work Plan, including addenda and revisions.
- C. Access by the Owner, Owners Representative or HPM: The Owner/Owner's Representative/HPM may enter control areas for brief periods of time provided they underwent proper training, donned disposable polyethylene gloves and disposable polyethylene foot covers, as a minimum. Additional protective equipment may be required if respiratory hazard is involved or if skin contact is involved. Contractor shall provide all required personnel protective equipment and training for the Owner/Owner's Representative/HPM as required for safe entry and visual inspection in contaminated areas.

1.07 SUBMITTALS

- A. Submit, as applicable, the following to the Owner/Owner's Representative/HPM for approval within 10 days of receiving the Notice to Proceed. These submittals are in addition to those required in Section 02 82 13 or Section 02 83 00. These submittals shall be submitted in accordance with Section 02 84 16:
 - 1. Training Certification of Employees: Submit certificates signed and dated by an officer of the Contractor and by each employee stating that the employee has received required training.
 - 2. Removal, Storage, Packaging, Transportation, and Disposal Work Plan: Submit a Removal, Storage, Packaging, Transportation, and Disposal Work Plan. Submit a detailed job-specific plan of the work procedures to be used in the removal of: fluorescent light bulbs; PCB-containing ballasts, other oils; and mercury containing devices. Include in the plan: eating, drinking, smoking and restroom procedures; leak and spill clean-up; procedures for identifying other hazardous materials and potentially hazardous materials; interface of trades; sequencing of related work; training requirements; respiratory protection requirements; personal protective equipment to be utilized; temporary storage locations; packaging procedures; transportation procedures and disposal sites. Include personal air sampling (if required), sampling methodology, frequency, duration of sampling, and qualifications of air monitoring personnel in the air sampling portion of the plan.
- B. Upon completion of all removal activities, submit to the Owner/Owner's Representative/HPM, documentation that includes the following.
 - 1. The Contractor shall keep records of all documents generated in the course of the work. These include copies of all forms and reports of spills, accidents, personal exposure monitoring, hazardous materials removal logs, and hazardous waste manifests. Copies of all records shall be submitted to the Owner/Owner's Representative/HPM at the completion of the work.

1.08 EQUIPMENT

- A. Personal Protective Equipment: Work clothes shall consist of Personnel Protection Equipment (PPE) as required by OSHA regulations, including, but not limited to the following:
 - 1. Disposable coveralls;
 - 2. Gloves;

3. Chemical safety goggles;
 4. Half mask cartridge respirator for mercury vapor, PCBs and/or other hazardous material - to be used for spills;
 5. Disposable foot covers (polyethylene).
- B. Leak/Spill Kit: Assemble a leak/spill kit to include at a minimum, the following items for maximum 200-gallon potential spills. For items where a larger spill potential exists, multiply quantities provided accordingly:
1. Gloves specifically rated for use in handling PCBs (six pairs);
 2. Disposable coverall specifically rated for use in handling PCBs (four each);
 3. Chemical safety goggles (two each);
 4. Disposable foot covers (polyethylene) (six pairs);
 5. PCB Caution Sign: "PCB-Spill --- Authorized Personnel Only" (two each);
 6. Banner guard or equivalent banner material (100 feet);
 7. Absorbent material (five bags);
 8. Rags (20 each);
 9. HEPA vacuum (one each);
 10. Poly lined DOT 17H drums (two each);
 11. Blue polyethylene waste bags (five each).

Note: All materials and equipment used to clean up a PCB spill become PCB waste and must be disposed of accordingly.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 REQUIREMENTS

- A. The Contractor shall furnish all labor, materials, and equipment necessary for the complete collection and removal of all PCBs, fluorescent light tubes, ballasts, mercury and other hazardous materials or potentially hazardous materials from the project site.
- B. All hazardous materials which are identified as in-scope requirements shall be properly packaged, delivered to, and disposed of at a properly licensed disposal facility. The PCB-containing articles shall be incinerated. The mercury-containing fluorescent tubes shall be recycled.
- C. The Contractor shall prepare hazardous waste manifest that will accompany the hazardous materials to the storage site. The Contractor shall ensure that a responsible person from the District signs the form. The Contractor is responsible to ensure that the form from point of origin to point of disposal is filled out completely and accurately for complete tracking of hazardous materials. A copy of each hazardous waste manifest shall be submitted to the following:

HazMat Doc
3080 Olcott Street, Suite 135D
Santa Clara, CA 95054
Tel: 408-748-0055
Fax: 408-748-0066

Re: (Project Name and Address)

- D. The Contractor shall verify that the storage site is capable of accepting the hazardous materials within regulatory compliance prior to delivery of the hazardous materials.
- E. Isolate a PCB control area by physical boundaries to prevent unauthorized entry of personnel.
- F. Personnel Protection: Workers shall wear and use PPE as required in Article 1.08 of this section upon entering a control area.
- G. Permissible Exposure Limits (PEL):
 - 1. The PEL for mercury is 0.05 mg/m³ of air based on an 8-hour time weighted average (TWA).
 - 2. The PEL for PCBs is 0.5 mg/m³ based on an 8-hour time weighted average basis.
 - 3. The Contractor shall perform Personal Sampling to ensure the PEL is not exceeded.
- H. Special Hazards
 - 1. Fluorescent light bulbs shall be handled with care during removal and packaging and any breakage shall be reported and the spill cleaned up immediately.
 - 2. Ballasts shall not be exposed to open flames or other high temperature sources since toxic decomposition by-products may be produced.
 - 3. Other hazardous materials or potentially hazardous materials shall be properly identified prior to handling or exposure.

I. Caution Label

1. Affix labels to all waste containers. Provide label with sufficient print size to be clearly legible, with bold print on a contrasting background, displaying the following:

| | |
|---|---------------|
| CAUTION: CONTAINS <i>(name of hazardous material)</i> | |
| DATE: _____ | SOURCE: _____ |
| EPA Generator No. _____ | |

J. Caution Signage

1. Per 29 CFR 1910.145, provide signs at approaches to PCB control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area.

3.02 WORK PROCEDURE

- A. Furnish all labor, materials, services, and equipment necessary for the complete removal of all PCB/Non-PCB Ballasts, fluorescent light bulbs, and other hazardous materials and potentially hazardous materials in accordance with federal, state, and local regulations.

1. Package and mark fluorescent light bulbs and ballasts as required by EPA and DOT regulations and dispose of offsite.
2. Provide packaging, available from the manufacturer, for the storage of fluorescent light bulbs. Provide 17C or 17H drums for packaging of PCB ballasts.
3. Fluorescent light bulbs, and ballasts labeled as "Non-PCB Containing" or "No PCBs", shall be packaged in leak-proof packaging, and be transported under manifest/trip ticket and disposed of for either (a) recycling or (b) disposal in full compliance with local, state and federal regulations. A manifest/trip-ticket or equivalent endorsed by the waste disposal facility or the recycler shall be provided to the HPM within 2 working days of the waste being moved of the site.

- B. Smoking: Smoking is not permitted within 50 feet of the control area. Provide and post "No Smoking" signs.

- C. Work Operations: Ensure that work operations or processes are conducted in accordance with the applicable requirements of this section, including but not limited to:

1. Obtain advance approval of storage sites.
2. Report spills/leaks to the Owner/Owner's Representative/HPM and maintain a record detailing the circumstances surrounding the leak/spill include the location, material leaked/spilled, estimated quantity, cleanup procedure utilized, and disposition of waste.
3. Maintain a spill/leak kit for immediate clean up of spill/leaks.
4. Maintain an access log of employees working in a control area and provide a copy to the District's representative upon completion of the operation.

3.03 REMOVAL WORK

- A. Establish a control area as specified in paragraph entitled “Control Area”. Only personnel briefed on the handling and safety precautions shall be allowed into the area.
- B. Work performed in confined spaces shall be performed in accordance with applicable Cal/OSHA requirements.
- C. Remove mercury containing bulbs and other devices intact and immediately package for disposal. Handle in a manner that will prevent skin contact.
- D. Remove all fluorescent light ballasts that are not marked “Non-PCB containing” or “No PCBs”. Place ballasts in DOT approved 17C or 17H drums. Handle PCBs such that no skin contact occurs.
- E. Remove all other equipment containing PCBs from site and transport to an approved decontamination facility for final disposal.

3.04 SPILL/LEAK REQUIREMENTS

- A. Spills/Leaks: Report any spill/leak to the District’s Representative immediately.
- B. Spill/Leak Control Area: Establish a spill/leak control area and restrict access to properly trained personnel utilizing appropriate personal protective equipment.
- C. Employee Safety: The contractor shall be responsible for ensuring that his personnel are knowledgeable and protected from the health and safety hazards of working with PCBs. The Contractor is advised to follow the guidance promulgated by EPA’s Standard Operating Safety Guides (latest edition), the NIOSH, OSHA, USCG, EPA’s Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (latest edition) based on 29 CFR 1910.120.
- D. Spill/Leak Cleanup Procedures
 - 1. Initiate cleanup of spill/leaks as soon as possible. Immediately transfer broken items into a DOT approved 17H, poly lined drum or other approved container. To clean up spills, personnel shall wear the PPE prescribed in paragraph entitle “Special Clothing.” Mop up any liquids with rags or other conventional absorbent. The spent absorbent shall be properly contained and disposed of as solid PCB waste. HEPA vacuum the spill area. HEPA vacuumed waste shall be drummed in a poly lined DOT 17H drum and labeled with a DOT approved caution label.
 - 2. The Contractor shall be responsible for the proper cleanup of all pre-existing or inadvertent spills or leaks. Any leaks shall be immediately stopped, contained, covered, and diked as necessary to facilitate clean-up operations and to prevent the hazardous materials from entering drains, storm sewers, or other water bodies. The District shall be immediately notified by a subsequent written report describing the details of the spill or leak, and what actions have been taken to clean-up the spill or leak. The hosing down of any spillage or leaks is prohibited. In the event of a Contractor caused fire involving hazardous materials, the Contractor shall be responsible for the cleanup of any contamination caused by the hazardous, toxic products of combustion.

3.05 STORAGE FOR DISPOSAL

A. Storage Containers

1. Intact fluorescent light bulbs shall be placed in the packaging that is available from the manufacturer.
2. Store non-liquid PCB mixtures, articles, or equipment in DOT Specification 17C or 17H containers.

B. The contractor shall properly label and mark all hazardous materials and ensure that the vehicle used to transport the hazardous materials is also placarded in accordance with EPA and DOT requirements.

C. Waste Containers: Label waste containers in accordance with the requirements of this section.

D. Temporary Onsite Storage: Obtain written approval for temporary onsite storage from the Owner/Owner's Representative/HPM. Temporary onsite storage areas must comply with the following: (1) Provide adequate roof and walls to prevent rainwater from reaching the stored material; (2) Provide containment curbs to prevent the spread of secondary contamination in the event of a container leak. Hazardous waste shall not be stored on site for longer than regulations allow, but in no case longer than 14 days or the end of the contractor's onsite activity – whichever is earlier.

E. The contractor shall make every endeavor to recycle as much of the waste generated from this project as possible. To this end the contractor may contact the following facilities to assist them in putting together a recycling plan for this project

AERC Recycling Facility
30677 Huntwood Avenue
Hayward, CA 94544
Tel: 510-429-1129
Fax: 510-429-1498
www.aercrecycling.com

Or

Lighting Resources Inc.
805 East Francis St.
Ontario, CA 91761
800-572-9253
www.lightingresourcesinc.com

3.06 CONTROL AREA HOUSEKEEPING

A. Maintain surfaces of the control area free of accumulations of fluorescent light bulb debris, PCBs, and other hazardous materials. Restrict the spread of dust and debris; keep waste from being distributed over work area. Do not remove the control area and warning signs prior to the District's representative's approval. Re-clean areas showing residual dust or debris.

END OF SECTION

**APPENDIX –A
SCOPE OF WORK**

SHEET NOTES FOR THE ABATEMENT SCOPE OF WORK

The following notes will apply in their entirety, without exclusions or exemptions, to the entire Scope of Work for this Project unless otherwise instructed to in writing:

1. These Buildings are slated for renovation and/or reconfiguration. Coordinate work activities with HPM, Construction Manager and other trades as applicable. Prior to the commencement of abatement or removal activities, it is the Contractors responsibility to reconcile all the abatement/removal scope of work materials and locations listed herein with the intent of the Project Construction Manager and/or the Owners Representative.
2. Contractors shall bid all quantities listed herein. Any and all additions and/or deductions shall be based on the Abatement Unit Prices (Appendix – B) attached hereto.
3. The Contractor shall be responsible for independently verifying ALL quantities enumerated.
4. The Contractor shall be responsible for the abatement/removal of ALL LISTED MATERIALS - IN ALL LOCATIONS as indicated in these documents.
5. The Contractor shall be responsible for the quantification of all materials actually removed from ALL LOCATIONS.
6. Any and all items that are left in/on the Building(s) that may be affected by of this Scope of Work are to be protected in place unless otherwise directed (in writing) by the Owner or the Owners designee.
7. These Scopes of Work are created on the basis of the Architectural Drawings and/or the information received from the Owner/the Owners representative. It is restricted to those materials surfaces and quantities that are designated to be impacted during the modernization. This is not a complete inventory of all known or suspect hazardous materials in these areas, nor should it be construed to be a comprehensive hazardous materials report for these work areas.

Asbestos Abatement Scope of Work Notes:

- a) All items enumerated are to be removed in accordance with Section 02 82 00 of the attached Specifications and in full compliance with current Local, State and Federal regulations. In the event of a conflict between the regulations and the specifications the most stringent shall apply.
- b) Multiple Containment(s) could be required in the same locations in order to coordinate activities with other trades. The Asbestos Removal Contractor's Base Bid shall include two (2) additional mobilizations (in addition to the initial mobilization) and containment costs per Building for Asbestos related work.
- c) For the removal of Asbestos Containing Materials by Mechanical Means and use of Regulated Solvents –
 - a. If ANY Asbestos Containing Materials are removed by Mechanical Means
(1a) **BAAQMD** Notification and Friable Material Removal Preparations will be required, and
(1b) The waste products must be disposed of as Hazardous Waste.
 - b. If Mastics/Adhesives are removed with Regulated Solvents
The waste products must be disposed of in accordance with prevailing regulations and the SDS for that Solvent.
- d) All Asbestos Containing Material Finishes are to be removed as directed in their entirety to the framing/substrate, including any insulation materials encountered. Framing/Substrate is to be cleaned of any residues, nails, etc, and remain intact.
- e) For the removal of Asbestos Containing Roofing Materials (ACRM) or roof related materials/sealants etc., all materials are to be removed in their entirety to the roof deck/wall. Roof deck/wall is to be cleaned of any residues, nails, etc, and remain intact. For penetrations/patches/edges, an additional 1' of roofing material around each roof penetration/patch/edge is to be removed (all layers to roof deck) to ensure the complete removal of the roofing sealant(s).

Poly Chlorinated Biphenyl Remediation Notes:

- a) All items enumerated are to be removed in accordance with Section 02 84 00 of the attached Specifications and in full compliance with current Local, State and Federal regulations. In the event of a conflict between the regulations and the specifications the most stringent shall apply.
- b) Light bulbs/tubes are to be removed and disposed of as Mercury containing waste.
- c) Light fixture ballasts are to be removed and disposed of as Poly-Chlorinated Bi-Phenyl (PCB) containing waste unless expressly labeled as "Non-PCB" or "No PCB's". If ballasts are labeled as "Non-PCB" or "No PCB's", they must be appropriately disposed of and/or recycled.
- d) All PCB containing caulking materials are to be completely removed from the concrete/CMU wall and the window systems - once removed. Any and all residue is to be removed and the concrete/CMU be decontaminated.

ASBESTOS, MERCURY AND PCB SCOPE OF WORK

SEPTEMBER 12, 2017

SUNOL COMMUNITY SCHOOL**BUILDING A RESTROOMS****Page 1 of 1**

All items enumerated below are to be removed and disposed of as ACM or ACRM unless otherwise noted.

| <u>ITEM #</u> | <u>LOCATION / MATERIAL</u> | <u>APPROXIMATE QUANTITY*</u> |
|----------------------|--|-------------------------------------|
| 1. | (Interior) Girls Restroom (Room 1) and Boys Restroom (Room 2) / Suspect Insulated Doors. NOTE: Remove Intact. If Abatement Contractor determines by coring that Doors have Suspect ACM Core Insulation, Dispose of as Asbestos Containing Material. If Door(s) are determined to have no Core Insulation, dispose of properly as construction waste. | 2 EA Door Leaves |
| 2. | (Interior) Girls Restroom (Room 1) and Boys Restroom (Room 2), in Concealed Locations (inside Wall/Ceiling Cavities and Attic/Plenum) / Pipe Fitting and Pipe Insulation Materials NOTE: The quantity listed for this item is an estimate only, provided for bidding purposes. Additions or deductions to this estimate will be done, on site, after work areas are opened up during the course of the Project. Additions or deductions will be pro-rated on the basis of the Unit Prices sheets (attached). | ≈ 10 LF |
| 3. | (Interior and Exterior) Girls Restroom (Room 1), Boys Restroom (Room 2), and Restroom Hallway (Room 6) (In areas designated in the Demolition Drawings) / Fluorescent Light Fixture Assemblies (Including Fixtures, Light Bulbs/Tubes and Ballasts). NOTE 1: Light bulbs/tubes are to be removed and disposed of as Mercury containing waste. NOTE 2: Light fixture ballasts are to be removed and disposed of as Poly-Chlorinated Bi-Phenyl (PCB) containing waste unless expressly labeled as "Non-PCB" or "No PCB's". If ballasts are labeled as "Non-PCB" or "No PCB's", they must be appropriately disposed of and/or recycled. | ≈ 7 EA Light Fixture Assemblies |

NOTE(S):

- A. REFER TO APPENDIX -A SCOPE OF WORK SHEET NOTES FOR ALL RELEVANT DIRECTIONS/INSTRUCTIONS FOR THIS SCOPE OF WORK.
- B. REFER TO ARCHITECTS DRAWING # A2.10, DATED 03/15/17, FOR ROOM NUMBER REFERENCE, ETC.

Key: ACM = Asbestos Containing Material; ACRM = Asbestos Containing Roofing Material; SF = Square Feet; LF = Linear Feet; EA = Each

APPENDIX –B
ABATEMENT UNIT PRICES

UNIT PRICES

ASBESTOS

| Item | Task | Qty | Unit Price | \$ Total (Qty x Unit Price) |
|------|---|------|------------|--------------------------------|
| 1. | Mobilization | 2 EA | | |
| 2. | Small Containment < 200 SF | 2 EA | | |
| 3. | Abate Thermal System Insulation – Pipe Fitting Insulation | 5 LF | | |
| 4. | Abate Doors with Asbestos containing Cores Cement | 2 EA | | |
| | Total Asbestos | | | |

MISCELLANEOUS

| Item | Task | Qty | Unit Price | \$ Total (Qty x Unit Price) |
|------|---|-------|------------|--------------------------------|
| 1. | Remove and Dispose of PCB Containing Fluorescent Light Fixture Ballast's | 50 EA | | |
| 2. | Remove and Dispose of Mercury Containing Fluorescent Light Bulbs/Tubes (Standard 48" tubes) | 50 EA | | |
| | Total Miscellaneous | | | |

UNIT PRICE TOTALS

| Task | \$ Total |
|-------------------------------|----------|
| Total Asbestos | |
| Total Miscellaneous | |
| GRAND TOTAL UNIT PRICE | |



EMSL Analytical, Inc.

464 McCormick Street San Leandro, CA 94577

Tel/Fax: (510) 895-3675 / (510) 895-3680

<http://www.EMSL.com> / sanleandrolab@emsl.com

EMSL Order: 091717154

Customer ID: HAZM63

Customer PO: 17-182

Project ID:

Attention: Maheen B. Doctor

HazMat Doc

3080 Olcott Street

Suite 135D

Santa Clara, CA 95054

Phone: (408) 748-0055

Fax: (408) 748-0066

Received Date: 08/30/2017 10:15 AM

Analysis Date: 08/31/2017

Collected Date: 08/28/2017

Project: 17-182 - SCCOE - Sunol Community School

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample | Description | Appearance | Non-Asbestos | | Asbestos % Type |
|---|--|--------------------------------------|----------------|---|--------------------|
| | | | % Fibrous | % Non-Fibrous | |
| 182-01 091717154-0001 | Hallway / 2'x4' Suspended Ceiling Tile | Tan Fibrous Homogeneous | 70% Cellulose | 15% Perlite 15% Non-fibrous (Other) | None Detected |
| 182-02 091717154-0002 | Hallway / Wallboard | White Non-Fibrous Homogeneous | 2% Cellulose | 80% Gypsum 18% Non-fibrous (Other) | None Detected |
| 182-03-Joint Compound 091717154-0003 | Hallway / Joint compound on wallboard | White Non-Fibrous Homogeneous | | 80% Ca Carbonate 20% Non-fibrous (Other) | None Detected |
| 182-04 091717154-0004 | Hallway / Joint tape on wallboard | Tan Fibrous Homogeneous | 90% Cellulose | 10% Non-fibrous (Other) | None Detected |
| 182-05 091717154-0005 | Hallway / Vinyl wall cover on wallboard | Tan Non-Fibrous Homogeneous | 25% Cellulose | 60% Matrix 15% Non-fibrous (Other) | None Detected |
| 182-06 091717154-0006 | Hallway / beige adhesive for baseboard | Beige Non-Fibrous Homogeneous | | 50% Ca Carbonate 50% Matrix | None Detected |
| 182-07 091717154-0007 | Hallway / green adhesive for carpet on concrete | Green Non-Fibrous Homogeneous | | 60% Matrix 40% Non-fibrous (Other) | None Detected |
| 182-08 091717154-0008 | Women's Restroom / Tan Vinyl Sheeting <i>This is a composite result of both vinyl and backing layer</i> | Beige Non-Fibrous Homogeneous | 30% Cellulose | 40% Matrix 30% Non-fibrous (Other) | None Detected |
| 182-09 091717154-0009 | Women's Restroom / Backing Paper on tan vinyl sheeting | Gray Non-Fibrous Homogeneous | 100% Cellulose | | None Detected |
| 182-10 091717154-0010 | Women's Restroom / yellow adhesive under tan vinyl sheeting | Yellow Non-Fibrous Homogeneous | | 60% Matrix 40% Non-fibrous (Other) | None Detected |
| 182-11 091717154-0011 | Women's Restroom / Adhesive for plastic wall panels | Tan Non-Fibrous Homogeneous | | 50% Ca Carbonate 50% Matrix | None Detected |
| 182-12 091717154-0012 | Women's Restroom / wallboard ceiling | White Non-Fibrous Homogeneous | 2% Cellulose | 80% Gypsum 18% Non-fibrous (Other) | None Detected |
| 182-13 091717154-0013 | Women's Restroom / Skim coat on wallboard ceiling | White Non-Fibrous Homogeneous | | 80% Ca Carbonate 20% Non-fibrous (Other) | None Detected |
| 182-14 091717154-0014 | Women's Restroom / Joint compound-tape on wallboard ceiling | White Fibrous Homogeneous | 90% Cellulose | 10% Non-fibrous (Other) | None Detected |

Initial report from: 08/31/2017 09:55:05



EMSL Analytical, Inc.

464 McCormick Street San Leandro, CA 94577

Tel/Fax: (510) 895-3675 / (510) 895-3680

<http://www.EMSL.com> / sanleandrolab@emsl.com

EMSL Order: 091717154

Customer ID: HAZM63

Customer PO: 17-182

Project ID:

Analyst(s)

Jared Martin (14)

Matthew Batongbacal
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Samples received in good condition unless otherwise noted. Estimated accuracy, precision and uncertainty data available upon request. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Reporting limit is 1%

Samples analyzed by EMSL Analytical, Inc San Leandro, CA NVLAP Lab Code 101048-3, WA C884

Initial report from: 08/31/2017 09:55:05

SCCOE
Sunol Community School
Bldg. A Restrooms

| Reading No. | Results | BUILDING | ROOM | SIDE | LOCATION | COMPONENT | SUBSTRATE | COLOR | CONDITION | Pb mg/cm ² |
|-------------|----------|----------|------------|-----------|----------|-----------------|-----------|-----------|-----------|-----------------------|
| 44 | Negative | BLDG. A | BOYS 2 | EAST | INTERIOR | TOILET | PLASTER | WHITE | FAIR | 0.02 |
| 45 | Negative | BLDG. A | BOYS 2 | EAST | INTERIOR | WALL | VINYL | WHITE | FAIR | 0.00 |
| 46 | Negative | BLDG. A | BOYS 2 | SOUTH | INTERIOR | WALL | VINYL | WHITE | FAIR | 0.00 |
| 47 | Negative | BLDG. A | BOYS 2 | SOUTH | INTERIOR | WALL ACCESS BOX | METAL | GRAY | FAIR | 0.00 |
| 48 | Negative | BLDG. A | BOYS 2 | SOUTH | INTERIOR | DOOR | WOOD | GRAY | FAIR | 0.00 |
| 49 | Negative | BLDG. A | BOYS 2 | SOUTH | INTERIOR | DOOR | WOOD | OFF-WHITE | FAIR | 0.00 |
| 50 | Negative | BLDG. A | BOYS 2 | SOUTH | INTERIOR | DOORFRAME | METAL | OFF-WHITE | FAIR | 0.09 |
| 51 | Negative | BLDG. A | BOYS 2 | SOUTH | INTERIOR | DOORFRAME | METAL | GRAY | FAIR | 0.06 |
| 52 | Positive | | INSTRUMENT | CALIBRATE | | | | | | 1.10 |
| 53 | Positive | | INSTRUMENT | CALIBRATE | | | | | | 1.10 |
| 54 | Positive | | INSTRUMENT | CALIBRATE | | | | | | 1.10 |

John G. [Signature] 17481
Tech: *John G. [Signature]*
CDHS I/A 10944
Pb = Lead
mg/cm² = milligrams / centimeter squared

SCCOE
Sunol Community School
Bldg. A Restrooms

Project # 17-182
Date: Aug. 28, 2017

| Reading No. | Results | BUILDING | ROOM | SIDE | LOCATION | COMPONENT | SUBSTRATE | COLOR | CONDITION | Pb mg/cm ² |
|-------------|----------|----------|------------|-----------|----------|------------------------------|-------------|-----------|-----------|-----------------------|
| 1 | | | SHUTTER | CALIBRATE | | | | | | 1.68 |
| 2 | Positive | | INSTRUMENT | CALIBRATE | | | | | | 1.10 |
| 3 | Positive | | INSTRUMENT | CALIBRATE | | | | | | 1.10 |
| 4 | Positive | | INSTRUMENT | CALIBRATE | | | | | | 1.10 |
| 5 | Negative | BLDG. A | HALLWAY 6 | EAST | INTERIOR | BEAM ABOVE CEILING TILE | METAL | RED BROWN | FAIR | 0.04 |
| 6 | Negative | BLDG. A | HALLWAY 6 | EAST | INTERIOR | BEAM ABOVE CEILING TILE | METAL | RED BROWN | FAIR | 0.00 |
| 7 | Negative | BLDG. A | HALLWAY 6 | EAST | INTERIOR | BEAM ABOVE CEILING TILE | METAL | RED BROWN | FAIR | 0.01 |
| 8 | Negative | BLDG. A | HALLWAY 6 | EAST | INTERIOR | 2' x 4' CEILING TILE | FIBER BOARD | WHITE | FAIR | 0.00 |
| 9 | Negative | BLDG. A | HALLWAY 6 | EAST | INTERIOR | 2' x 4' CEILING TILE GRID | METAL | OFF-WHITE | FAIR | 0.00 |
| 10 | Negative | BLDG. A | HALLWAY 6 | EAST | INTERIOR | WALL | VINYL | LT. GRAY | FAIR | 0.03 |
| 11 | Negative | BLDG. A | HALLWAY 6 | EAST | INTERIOR | WALL BASE | VINYL | BLACK | FAIR | 0.00 |
| 12 | Negative | BLDG. A | HALLWAY 6 | EAST | INTERIOR | FIRE EXTINGUISHER BOX | METAL | LT. GRAY | FAIR | 0.00 |
| 13 | Negative | BLDG. A | HALLWAY 6 | EAST | INTERIOR | DRINKING FOUNTAIN GUARD RAIL | METAL | LT. GRAY | FAIR | 0.00 |
| 14 | Negative | BLDG. A | HALLWAY 6 | EAST | INTERIOR | WALL BASE | VINYL | BLACK | FAIR | 0.00 |
| 15 | Negative | BLDG. A | HALLWAY 6 | EAST | INTERIOR | CEILING | DRYWALL | LT. GRAY | FAIR | 0.00 |
| 16 | Negative | BLDG. A | HALLWAY 6 | EAST | INTERIOR | CEILING LIGHT UNIT | METAL | LT. GRAY | FAIR | 0.00 |
| 17 | Negative | BLDG. A | GIRLS 1 | NORTH | INTERIOR | DOOR | WOOD | GRAY | FAIR | 0.00 |
| 18 | Negative | BLDG. A | GIRLS 1 | NORTH | INTERIOR | DOOR | WOOD | OFF-WHITE | FAIR | 0.00 |
| 19 | Negative | BLDG. A | GIRLS 1 | NORTH | INTERIOR | DOORFRAME | METAL | OFF-WHITE | CHIPPING | 0.06 |
| 20 | Negative | BLDG. A | GIRLS 1 | NORTH | INTERIOR | DOORFRAME | METAL | GRAY | FAIR | 0.04 |
| 21 | Negative | BLDG. A | GIRLS 1 | NORTH | INTERIOR | FLOOR TRANSITION STRIP | VINYL | BLACK | FAIR | 0.00 |
| 22 | Negative | BLDG. A | GIRLS 1 | NORTH | INTERIOR | FLOOR COVERING | VINYL | BEIGE | FAIR | 0.00 |
| 23 | Negative | BLDG. A | GIRLS 1 | NORTH | INTERIOR | WALL | VINYL | WHITE | FAIR | 0.00 |
| 24 | Negative | BLDG. A | GIRLS 1 | NORTH | INTERIOR | SINK | PLASTER | WHITE | FAIR | 0.00 |
| 25 | Negative | BLDG. A | GIRLS 1 | NORTH | INTERIOR | CEILING VENT | METAL | WHITE | FAIR | 0.00 |
| 26 | Negative | BLDG. A | GIRLS 1 | NORTH | INTERIOR | CEILING | DRYWALL | OFF-WHITE | FAIR | 0.00 |
| 27 | Negative | BLDG. A | GIRLS 1 | NORTH | INTERIOR | CEILING LIGHT UNIT | METAL | WHITE | FAIR | 0.00 |
| 28 | Negative | BLDG. A | GIRLS 1 | EAST | INTERIOR | WALL | VINYL | WHITE | FAIR | 0.00 |
| 29 | Negative | BLDG. A | GIRLS 1 | EAST | INTERIOR | TOILET | PLASTER | WHITE | FAIR | 0.00 |
| 30 | Negative | BLDG. A | GIRLS 1 | EAST | INTERIOR | TOILET | PLASTER | WHITE | FAIR | 0.00 |
| 31 | Negative | BLDG. A | GIRLS 1 | EAST | INTERIOR | PARTITION WALL | PLASTIC | BLACK | FAIR | 0.00 |
| 32 | Negative | BLDG. A | GIRLS 1 | EAST | INTERIOR | PARTITION WALL DOOR | PLASTIC | BLACK | FAIR | 0.00 |
| 33 | Negative | BLDG. A | GIRLS 1 | SOUTH | INTERIOR | WALL | VINYL | WHITE | FAIR | 0.00 |
| 34 | Negative | BLDG. A | GIRLS 1 | WEST | INTERIOR | WALL | VINYL | WHITE | FAIR | 0.00 |
| 35 | Negative | BLDG. A | GIRLS 1 | WEST | INTERIOR | CONDUIT PIPE | METAL | WHITE | FAIR | 0.00 |
| 36 | Negative | BLDG. A | BOYS 2 | WEST | INTERIOR | WALL | VINYL | WHITE | FAIR | 0.00 |
| 37 | Negative | BLDG. A | BOYS 2 | WEST | INTERIOR | CEILING VENT | METAL | WHITE | FAIR | 0.00 |
| 38 | Negative | BLDG. A | BOYS 2 | NORTH | INTERIOR | WALL | VINYL | WHITE | FAIR | 0.00 |
| 39 | Negative | BLDG. A | BOYS 2 | NORTH | INTERIOR | FLOOR COVERING | VINYL | BEIGE | FAIR | 0.00 |
| 40 | Negative | BLDG. A | BOYS 2 | NORTH | INTERIOR | SINK | PLASTER | WHITE | FAIR | 0.03 |
| 41 | Negative | BLDG. A | BOYS 2 | NORTH | INTERIOR | URINAL | PLASTER | WHITE | FAIR | 0.00 |
| 42 | Negative | BLDG. A | BOYS 2 | NORTH | INTERIOR | URINAL | PLASTER | WHITE | FAIR | 0.02 |
| 43 | Negative | BLDG. A | BOYS 2 | EAST | INTERIOR | SINK | PLASTER | WHITE | FAIR | 0.01 |

Tech: *[Signature]*
CDHS I/A 10944
Pb = Lead
mg/cm² = milligrams / centimeter squared