# Project Manual

for

TRUAX EXTERIOR IMPROVEMENTS
**ROOFING/HVAC/ACCESS LADDER PROJECT**

400 Rancho Del Oro Dr., Oceanside, CA 92057

## VOLUME 1 and 2

Specifications for the

**Oceanside Unified School District**
2111 Mission Avenue
Oceanside, CA 92058

November 29, 2021

Project No.: P2136900ME

**DSA App. 04-120740**
**DSA File #37-H7**

11455 El Camino Real, Suite 480 \\ San Diego, CA 92130 \\ P 619-695-0400 \\ F 619-695-0346 \\ PBK-WLC.com

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# **ROOFING/HVAC/ACCESS LADDER PROJECT**

400 Rancho Del Oro Dr., Oceanside, CA 92057

for the

## **Oceanside Unified School District**

November 29, 2021
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IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 04-120740 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 03/03/2022

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**END OF DOCUMENT 00 00 10**

# VOLUME 2

# Specifications

## TRUAX EXTERIOR IMPROVEMENTS
## **ROOFING/HVAC/ACCESS LADDER PROJECT**

400 Rancho Del Oro Dr., Oceanside, CA 92057

**Oceanside Unified School District**
2111 Mission Avenue
Oceanside, CA 92058

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## SECTION 01 10 00 SUMMARY

## PART 1 GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SECTION INCLUDES: REQUIREMENTS SUMMARY

A. including but not limited to:
1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work by Owner.
5. Work under separate contracts.
6. Future Work.
7. Purchase contracts.
8. Owner furnished products.
9. Owner furnished, Contractor installed products.
10. Access to site.
11. Coordination with occupants.
12. Work restrictions.
13. Specification and drawing conventions.
14. Miscellaneous provisions.

### 1.3 PROJECT INFORMATION

A. Project Identification:
1. Project Location: **El Camino HS - Truax Theater**
400 Rancho Del Oro Drive
Oceanside, CA 92057

B. Owner: **Oceanside Unified School District**
2111 Mission Avenue
Oceanside, CA 92058

C. Engineer of Record: **LEAF Engineers**
11455 El Camino Real
Suite 480
San Diego, CA 92130

D. Consultants: Additional design professionals have been retained who have prepared designated portions of the Contract Documents. Refer to “stamp” page this project manual.

### 1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following: The project scope includes the replacement of existing Roofing, HVAC system, and Ladders including miscellaneous casework replacement, ceiling replacement, patching and painting.
1. Buildings effected on the site are:
a. H – Truax Theater Building

B. Type of Contract: Project will be constructed under a Single Prime Contractor.

## 1.5 WORK BY OWNER AND UNDER SEPARATE CONTRACTS

A. The Owner reserves the right to let separate contract for work outside of the scope of this Contract. Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

B. Owner Furnished Products (OFCI): The Owner will furnish products indicated. The work includes receiving, unloading, handling, storing, protecting, and installing Owner furnished products and making building services connections when applicable.
   1. Owner Furnished Products: Coordinate with Owner (Classroom equipment by Owner)

## 1.6 ACCESS TO SITE

A. Use of Site: Limit use of Project site to Work in areas and areas within the Contract limits indicated. Do not disturb portions of site beyond areas in which the Work is indicated.
   1. Limits: The drawings indicate the limits of the construction operations.
   2. Driveways, Walkways, and Entrances: Keep driveways. parking areas, student drop off and pick up points, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, the students, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
      b. Schedule deliveries to minimize use of driveways and entrances by construction operations.
      c. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

B. Condition of Existing Building: Maintain portions of existing building affected by construction operations in weathertight condition throughout construction period. Repair damage caused by construction operations.

## 1.7 COORDINATION WITH OCCUPANTS

A. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
   1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
   2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
   3. Before limited Owner occupancy, ensure mechanical and electrical systems are fully operational, and required tests and inspections and start up procedures are successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
   4. Upon occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

## 1.8 WORK RESTRICTIONS

A. Work Restrictions: Comply with restrictions on construction operations. Comply with limitations on use of public streets and with other requirements of authorities having

jurisdiction.

B. On Site Work Hours: Limit Work in the existing building to normal working hours, Monday through Friday, unless otherwise indicated. Coordinate with Owner when it is necessary to extend working hours or Work on weekends.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and after providing temporary utility services according to requirements indicated:
1. Notify Owner not less than two weeks in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
1. Notify Owner not less than two weeks in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.

E. Controlled Substances, Firearms, and Explosive Devices: Use of tobacco products, controlled substances, firearms, and explosive devices on the site is not permitted.

F. Employee Identification: Provide identification tags for Contractor personnel working on site. Require personnel to use identification tags at all times.

G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on site.
1. Maintain list of approved screened personnel with Owner's representative.

### 1.9 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 1 General Requirements: Requirements of Sections in Division 1 apply to the Work of each specification section.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations.

## PART 2 PRODUCTS

Not Used

## PART 3 EXECUTION

### 3.1 CONSTRUCTION SCHEDULE

A. The Owner has a critical need for the work to beqin upon Notice to Proceed and shall be Substantially Complete by August 20,2022. **There will be No Extensions of Time due to weather.**

**END OF SECTION 01 10 00**

# SECTION 01 73 29 CUTTING AND PATCHING

## PART 1 GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes: Procedural requirements for cutting and patching.

### 1.3 DEFINITIONS

A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair Work required to restore surfaces to original conditions after installation of other Work.

### 1.4 SUBMITTALS

A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
   1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
   2. Changes to In Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
   3. Products: List products used for patching and firms or entities that will perform patching Work.
   4. Dates: Indicate when cutting and patching will be performed.
   5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
      a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

### 1.5 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

B. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.

C. Operational Elements: Do not cut and patch operating elements and related components that results in reducing the capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
   1. Primary operational systems and equipment.

2. Fire separation assemblies.
3. Air or smoke barriers.
4. Fire suppression systems.
5. Mechanical systems piping and ducts.
6. Control systems.
7. Communication systems.
8. Fire-detection and -alarm systems.
9. Conveying systems.
10. Electrical wiring systems.
11. Operating systems of special construction.

D. Miscellaneous Elements: Do not cut and patch the following elements or related components that change the load bearing capacity, resulting in a reduction of capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Exterior curtain wall construction.
4. Equipment supports.
5. Piping, ductwork, vessels, and equipment.
6. Noise and vibration control elements and systems.
7. Sprayed fire resistive material.

E. Visual Requirements: Do not cut and patch construction resulting in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
1. If possible, retain original Installer or fabricator to cut and patch exposed Work. If possible, engage original Installer or fabricator. If original installer is not available, engage recognized, experienced, and specialized firm for the Work.
   a. Processed concrete finishes.
   b. Ornamental metal.
   c. Matched veneer woodwork.
   d. Preformed metal panels.
   e. Roofing.
   f. Firestopping.
   g. Window system.
   h. Fluid applied flooring.
   i. Wall covering.
   j. HVAC enclosures, cabinets, or covers.

F. Cutting and Patching Conference: Before proceeding, meet at site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

## 1.6 WARRANTY

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

## PART 2 PRODUCTS

### 2.1 MATERIALS

A. Comply with specified requirements.

B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

## PART 3 EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Services: Where removal, relocation, or abandonment is necessary, bypass existing services before cutting to avoid interruption of services to occupied areas.

### 3.3 CUTTING AND PATCHING

A. Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at earliest feasible time, and complete without delay.
   1. Cut existing construction to provide for installation of components or performance of construction, and subsequently patch as necessary to restore surfaces to an original condition.
   2. Cut in place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Temporary Support: Provide temporary support of Work to be cut.

C. Protection: Protect in place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to

requirements in Section 01 10 00; Summary of work and what is shown on drawings.

E. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   1. Use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. Finished Surfaces: Cut or drill from exposed or finished side into concealed surfaces.
   3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. Excavating and Backfilling: Comply with requirements in applicable earthwork specifications by cutting and patching operations.
   5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
   6. Proceed with patching after construction operations requiring cutting are complete.

F. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
   1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
   2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction to eliminate evidence of patching and refinishing.
      a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
      b. Restore damaged pipe covering to its original condition.

   3. Floors and Walls: Where walls or partitions are removed, extend one finished area into another, patch and repair surfaces in new space. Provide even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.
   4. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
   5. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
   6. Exterior Building Enclosure: Patch components and restore enclosure to a weathertight condition.

**END OF SECTION 01 73 29**

# SECTION 02 41 13 SELECTIVE SITE DEMOLITION

## PART 1 GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:
   1. Furnishing all labor, materials, and equipment necessary for demolition, dismantling, cutting, and alterations as indicated, specified, and required for completion of the Contract, as applicable. Includes items such as the following:
      a. Protecting existing work to remain.
      b. Cleaning soiled materials that are to remain.
      c. Disconnecting and capping utilities.
      d. Removing debris and equipment.
      e. Removal of items indicated on Drawings.
      f. Salvageable items to be retained by Owner as indicated on Drawings and during the pre-construction job walk.

### 1.3 DEFINITIONS

A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain Owner's property.

B. Remove and Salvage: Items indicated to be removed and salvaged remain Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to location as directed by Owner's representative.

C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse. Store and protect against damage. Reinstall items in locations indicated.

D. Existing to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by Owner's representative, items may be removed to a suitable, protected storage location during demolition and then cleaned and reinstalled in their original locations.

E. Replace: Remove and legally dispose of existing item(s) indicated and install new like item(s) that conform to Project Specifications.

### 1.4 QUALITY ASSURANCE

A. Comply with the following:
   1. Applicable codes, ordinances, and regulations of local, municipal, state, and federal authorities having jurisdiction.
   2. Comply strictly Fugitive Dust Control, Bay Area Air Quality Management District
   3. Obtain necessary permits and notices; post where required.
   4. Comply with safety requirements of the local fire department.
   5. Comply with ANSI A10.6.

B. Notify affected utility companies before starting Work and comply with their requirements.

C. Carefully perform demolition work by skilled workers experienced in building demolition procedures, using appropriate tools and equipment. Perform work, at all times, under the direct supervision of a supervisor approved by Owner's inspector.

D. Coordinate demolition with other trades to ensure correct sequence, limits, and methods of proposed demolition. Schedule work to create least possible inconvenience to the public and to facility operations.

E. Pre-Demolition:
   1. Conduct conference at Project site seven (7) days prior to scheduled installation:
      a. Conference agenda shall include review and discussion of requirements of authorities having jurisdiction, instructions and requirements of serving utilities, sequencing and interface considerations, and Project conditions.
      b. Conference shall be attended by supervisory and quality control personnel of Contractor and all subcontractors performing this and directly related work. Submit minutes of meeting to design builder's representative for Project record purposes.

F. Ownership of Materials:
   1. Except for items or materials indicated to be reused, salvaged, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from the site with further disposition at Contractor's option.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Items scheduled for salvage by Owner shall be delivered to a location designated by Owner's authorized representative. Items shall be cleaned, packaged, and labeled for storage.

B. Items scheduled for reuse shall be stored onsite and protected from damage, soiling, and theft.

C. Follow legal requirement to hand expose to the point of no conflict 24 inches on either side of the underground facility, so its exact location is known before using power equipment.

D. Note: If caught digging without a Dig Alert ticket, a fine of up to fifty thousand dollars ($50,000.00) may be assessed per California government code 4216.

# PART 2 PRODUCTS

## 2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: The onsite shallow sands encountered in the borings are considered non-expansive and following proper processing should be suitable for backfilling purposes provided they are free of deleterious materials and oversize particles. Import materials may also be used for backfilling. The onsite or imported materials being used for backfilling should be non-expansive (EI less than 20), and should be in compliance with the specifications of the Project's soils report.

B. Backfill and Native Fill Materials: The onsite soils may be reused as compacted engineered fill provided they comply with the requirements of satisfactory soil materials as described above.

C. Engineered Fill: Satisfactory soil materials/borrow fill material, as described above, placed in lifts no greater than eight inches (8") thick (loose measurements) and each lift moisture conditioned. All engineered fill should be densified to a minimum relative compaction of 90

percent per ASTM D1557.

D. Backfill Material for Trenches: The onsite soils have been determined to be suitable for being used for backfilling purposes in trenches. Utility trenches should be backfilled with granular materials and mechanically compacted to at least 90 percent of the maximum dry density of the soils.

## PART 3 EXECUTION

### 3.1 PROJECT CONDITIONS

A. Drawings may not indicate in detail all demolition work to be carried out. Carefully examine existing conditions to determine full extent of demolition required. All utilities, whether shown on Drawings or not, to be capped at the property line U.N.O.

B. Repair damage due to demolition activities to existing improvements to remain at no additional cost to Owner. Repair or replace as directed by Owner's inspector.

C. Take measures to avoid excessive damage from inadequate or improper means and methods, or improper shoring, bracing, or support. Repair or replace any resulting damage at no additional cost to Owner as directed by Owner's inspector.

D. If conditions are encountered that vary from those indicated, notify Owner's inspector for instructions prior to proceeding. Owner assumes no responsibility for actual condition of structures to be demolished.

E. Inform Owner immediately upon discovery of asbestos products, radioactive materials, toxic wastes, or other hazardous materials. Do not remove hazardous materials without Owner authorization.

F. Adjacent roadways/passageways:
   1. Maintain fire department access through all phases of the Project.
   2. Obstruction of streets, walks, or other adjacent facilities will not be allowed.

### 3.2 DIG ALERT NOTIFICATION

A. Before any excavation in or near the public right-of-way, Contractor must contact the Underground Service Alert or USA-North (Dig Alert) at 811 or 800-642-2444 for information on buried utilities and pipelines.

B. Delineation of the proposed excavation site is mandatory. Mark the area to be excavated with water soluble or chalk based white paint on paved surfaces or with other suitable markings such as flags or stakes on unpaved areas.

C. Call at least two (2) full working days prior to digging.

D. If the members (utility companies) have facilities within the work area, they will mark them prior to the start of excavation; if not, they will provide notice of no conflict. A different color is used for each utility type (electricity is marked in red, gas in yellow, water in blue, sewer in green, telephone and cable TV in orange).

### 3.3 GENERAL

A. Protection:
   1. Do not begin demolition until safety partitions, barricades, warning signs, and other

forms of protection are installed.
2. Provide safeguards, including warning signs, lights and barricades, for protection of occupants and the general public during demolition.
3. Provide and maintain fire extinguishers. Comply with requirements of governing authorities.
4. Maintain existing utilities that are to remain in service and protect from damage during operations.

B. Safety: If at any time safety of existing construction appears to be endangered, take immediate measures to correct such conditions; cease operations and immediately notify Owner's inspector. Do not resume demolition until directed by Owner's inspector.

C. Noise and Dust Abatement: Exercise all reasonable and necessary means to abate dust, dirt rising, and undue noise. Perform necessary sprinkling and wetting of construction site to allay dust as required by applicable codes and ordinances.

D. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations. Do not create hazardous or objectionable conditions, such as flooding and pollution, when using water.

E. Water for Dust Control: Contractor shall obtain and pay for all water required for dust control operations. This may include, but is not limited to, payment of deposits to utility for construction meter, and payment of all monthly service and water charges. Construction meter shall be in place throughout construction period unless alternative arrangements are made with the City of Santa Rosa Water Department to provide construction water for all purposes. Contractor shall be aware of water moratoriums and restrictions, and shall immediately advise Owner of effects on construction schedules.

F. An eight-foot-high (8') chain link fence and gates shall be erected prior to any demolition operations at the construction limits perimeter. Coordinate the exact location with Owner.

G. Debris Removal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level.

H. Progress Cleaning: Clean adjacent buildings and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing before start of demolition.

I. Where performing contracted scope of work requires coring of existing concrete, brick masonry, or CMU structures (including walls, floors, and sitework), Contractor shall obtain and document means of verifying existence and location of embedded steel reinforcing materials within said concrete, brick, and CMU assemblies. Contractor shall locate reinforcement by means of noninvasive technology, such as X-ray photography, for the purposes of protecting said reinforcement in place and shall not damage any reinforcement materials (rebar, etc.) unless specifically detailed as such and approved by the authority having jurisdiction.

J. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

K. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

L. Contractor shall provide temporary weather protection during interval between demolition and removal of existing construction, on exterior surfaces, and new construction to ensure that no water leakage or damage occurs to structure or interior areas.

M. Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of building to be selectively demolished.

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

O. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials if exposed; repaired surfaces shall match existing adjacent surface color finish and texture:
   1. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction to remain in a manner that eliminates evidence of patching and refinishing.

P. Disposal: Promptly dispose of demolished materials; do not allow demolished materials to accumulate onsite.

## 3.4 PREPARATION

A. Prevent movement or settlement of adjacent structures. Provide bracing and shoring as necessary.

B. Utilities:
   1. The Drawings do not purport to show all below-grade conditions and objects on the site. Contractor shall perform field investigations as necessary to establish location of underground utility services and other features affecting earthwork.
   2. Mark location of underground utilities on asphalt pavement with paint.
   3. Disconnect and cap utility services; comply with requirement of governing authorities.
   4. Contractor shall arrange and notify utility company in advance of date and time when service needs to be disconnected.
   5. Do not commence demolition operations until associated disconnections have been completed.
   6. Should utilities and other below-grade conditions be encountered that adversely affect the Work, discontinue affected Work and notify Owner's representative and Architect and request direction. Unforeseen conditions will be resolved in accordance with provisions of the General Conditions of the Contract.
   7. Should a utility line or structure be damaged, immediately notify the responsible utility company or agency and notify Owner’s representative and Architect:
      a. Repair or replace all damaged utility lines and structures as directed by the responsible utility company or agency.
      b. Repair or replacement of damaged utility lines and structures whose location or existence has been made known to Contractor shall be at no change in the Contract Time and Contract price.

C. Structures to be demolished shall be inspected for hazardous materials; such materials shall be removed and disposed of before general demolition begins.

D. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by Owner's representative and authority having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner's representative and authority having jurisdiction.

## 3.5 EXPLOSIVES

A. Explosives: Use of explosives will not be permitted.

## 3.6 DEMOLITION

A. Demolition, General:
   1. With certain exceptions, Contractor shall raze, remove, and dispose of all buildings and foundations, structures, paving, fences, and other obstructions that lie wholly or partially within the construction limits identified on Drawings. The exceptions are utility-owned equipment and any other items the Owner/Documents may direct Contractor to leave intact or re-use onsite. Cease demolition immediately if adjacent structures appear to be in danger.
   2. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
   3. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner's representative and authority having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
   4. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area:
      a. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
      b. Protect existing site improvements, appurtenances, and landscaping to remain.
      c. Completely remove below-grade construction, including foundation walls and footings.
   5. Damages: Promptly repair damages to adjacent facilities caused by demolition operations.
   6. Unless otherwise indicated on the Plans, remove all demolished material from the site and dispose of at approved disposal sites. Comply with all requirements for recycling of demolished material as called for in Division 01 of this Specification. Contractor shall obtain necessary permits for the transportation of material from the site.

## 3.7 REMOVAL OF EXISTING PLUMBING AND ELECTRICAL EQUIPMENT AND SERVICES

A. Remove existing plumbing and electrical equipment fixtures and services not indicated for reuse and not necessary for completion of Work. Remove abandoned lines and cap unused portions of existing lines. Contractor is responsible for completely surveying the site and locating all existing utilities, above and below ground, before contracting to perform the work.

B. Asbestos – Cement (A-C) Pipe Removal and Disposal: The Plans for the Project may indicate that existing asbestos-cement pipe is to be removed from the ground. Where so indicated, Contractor shall excavate with care, expose the pipeline, and remove the A-C pipe to the nearest joint. Should the Plans not call out the removal of the A-C pipe and A-C pipe is encountered, Contractor shall obtain approval from Owner as to whether or not the A-C pipe is to be removed or can be left in place. Cutting of the pipe shall only be done if there is no other way to expose the length of pipe to the nearest joint that be separated and Owner approves the cutting of the pipe. Cutting of the pipe shall be done with a mechanical saw with a pressure water source to dampen the pipe and the dust from the cutting. To remove a coupling, the coupling may have to be broken in the trench. The pipe once removed from the trench may be broken for handling. The breaking shall be done within a plastic bagging or sheeting material to minimize the release of asbestos fibers into the atmosphere. Once removed and broken, if necessary, the A-C material shall be bagged and disposed of legally with Owner being given a copy of all Contractor paperwork as to the legal disposal of the material. If the A-C pipe section(s) are removed intact, the pipe can be removed by

Contractor from the Project site and become the property and responsibility of Contractor.

## 3.8 CLEANING

A. Clean existing materials to remain, using appropriate tools and materials.

B. Protect adjacent materials and equipment during cleaning operations.

## 3.9 RESTORATION

A. Restoration of Site Finishes:
   1. Concrete paving: Where it is necessary to excavate a trench across, make a cut in concrete paved areas, cut concrete with cutting saw, full depth of paving.
   2. Bituminous paving: Where it is necessary to excavate a trench across, make a cut in bituminous paved areas, either first score paving with a concrete cutting saw, in neat straight lines, prior to removing paving, or make straight cuts with pneumatic spade.
   3. Restoration of paving: Restore all paved areas to their original condition using material of like type and quality as the removed paving. Paving in public ways shall conform to applicable requirements of authorities having jurisdiction. Repaired surfaces shall match existing adjacent paving except minimum depth shall be 3-1/2 inches where existing paving is less than 3-1/2 inches.
   4. Restoration of landscape planting: Restore soil and plant materials to match original condition, including additional topsoil, topsoil grading and preparation, new plant materials, and plant maintenance during establishment period.

## 3.10 MAINTENANCE

A. Install and maintain all erosion control devices, including sandbag and gravel bag dikes, silt fences, de-silting basins, inlet barricades, vehicle wash traps, and other features called for in the Storm Water Pollution Prevention Plan and Temporary Erosion Control Plans.

## 3.11 CLEAN-UP/DISPOSAL

A. Coordinate building access with the Owner's inspector. Review and schedule waste storage and removal, include truck access to site.

B. Debris shall be dampened by fog water spray prior to transporting by truck.

C. Debris pick-up area shall be kept broom-clean and shall be washed daily with clean water.

D. Remove waste and debris other than items to be salvaged. Turn over salvaged items to Owner, or store and protect for reuse where scheduled. Continuously clean-up and remove items as demolition work progresses. Do not allow waste and debris to accumulate in building or onsite.

**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 other Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

A. Section Includes: Requirements including but not limited to:
   1. Demolition and removal of selected portions of building or structure.
   2. Demolition and removal of selected portions of existing built-up roof.
   3. Demolition and removal of existing mechanical equipment.
   4. Accessories necessary for demolition and deconstruction.

### 1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose offsite.

B. Remove and Reinstall: Detach items from existing construction with care to prevent damage, clean and refurbish, prepare for reuse, store as necessary, and reinstall where indicated.

C. Deconstruct: To remove by disassembling or detaching an item from a surface, using methods and equipment to successfully prevent damage to the item and surfaces; and dispose of items.

### 1.4 MATERIALS OWNERSHIP

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

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and the contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

### 1.5 SUBMITTALS

A. Qualification Data: Submit copies of qualifications for refrigerant recovery technician.

B. Engineering Survey: Submit engineering survey of condition of building, and roof structures.

C. Proposed Protection Measures: Submit report, including Drawings, indicating proposed measures for protecting individuals and property, for environmental protection, dust control and noise control. Indicate proposed locations, types, and construction of barriers.

D. Schedule of Selective Demolition Activities:
   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on site operations are uninterrupted.
   2. Interruption of utility services. Indicate how long utility services will be interrupted.
   3. Coordination for shutoff, capping, and continuation of utility services.
   4. Use of elevator and stairs.
   5. Coordination of Owner's continuing occupancy of portions of existing building and of

Owner's partial occupancy of completed Work.

E. Inventory: Submit a list of items for removal and location of storage of existing items to be removed saved and replaced (Tile Roofing)

F. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces that could be construed as damage caused by demolition operations. Comply with Section 013230. Submit prior to commencement of the work.

G. Statement of Refrigerant Recovery: Submit statement signed by refrigerant recovery technician responsible for recovering refrigerant, stating that refrigerant present was recovered and recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

H. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

## 1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Demolition Standards: Comply with ASSE A10.6 and NFPA 241.
2. Comply with EPA regulations prior to commencement of the work. Comply with hauling and disposal regulations of authorities having jurisdiction.
3. Comply with applicable federal, state, and local codes for demolition work, dust and noise control, safety of structure, and debris removal.
4. Obtain required permits from authorities having jurisdiction.

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

C. Pre-Demolition Conference: Conduct conference at the site.
1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction scheduled to remain and requires protection.
6. Review with Owner; on site staging areas for equipment and material storage and waste containment bins location and access.
7. Security for building access and site access as well as for items noted in 6.

## 1.7 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Provide minimum of 72 hours' notice to Owner of demolition activities that will affect Owner's operations including but not limited to:
1. Interruption of power.
2. Interruption of utility services.
3. Excessive noise.
4. Heavy equipment access to site.

B. Condition of Structure: Conditions existing at time of inspection will be maintained by

Owner as far as practical. Owner assumes no responsibility for actual condition of items or structures to be demolished.

1. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
2. Before commencing selective demolition, Owner will remove the following items:
   a. Classroom equipment (Tables, Chairs and District owned items).

C. Hazardous Materials: It is not anticipated that hazardous materials will be encountered in the Work.
   1. Hazardous materials will be removed by Owner before start of the Work.
   2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

D. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by at least 12 inches (300 mm).

E. Storage or sale of removed items or materials on site is not permitted.

F. Traffic: Conduct operations and debris removal to ensure minimum interference with roads, streets, drives, fire lanes, walks, accessible paths, and adjacent occupied or used facilities.
   1. Do not close, block, or obstruct streets, drives, walks, or occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around obstructed traffic ways.

G. Explosives: Explosives are NOT permitted at the site.

H. Flame Cutting: Do not use cutting torches for removal until flammable materials are removed. At concealed spaces, verify conditions prior to flame cutting operations. Maintain portable fire suppression devices during flame cutting operations.

I. Environmental Controls: Use water sprinkling, temporary enclosures, or other acceptable methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection. Do not use water when it may create hazardous or objectionable conditions.

J. Utility Services: Maintain existing utilities and protect against damage during demolition operations.
   1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, acceptable to Owner and governing authorities.

K. Protections: Provide temporary barriers to protect Owner's personnel and public from injury from work.
   1. Take protective measures to provide free and safe passage to occupied portions of building.
   2. Provide protection to ensure safe passage of the Owner’s personnel and the public around demolition areas and to and from occupied portions of adjacent areas, buildings, and structures.
   3. Provide 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 existing work which becomes exposed during demolition operations.
      a. Protect existing improvements, appurtenances, and conditions to remain.
      b. Protect adjacent floors with coverings.

c. Protect walls, openings, roofs, and adjacent exterior construction to remain and exposed to building demolition operations.

5. Construct temporary insulated dustproof partitions to separate areas from noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks. Refer to Drawings for location of partitions to be provided.
6. Provide temporary weather protection when exposing exterior conditions to prevent water leakage or damage to structure or interior areas of existing building.

L. Damages: Promptly repair damages caused to adjacent facilities by demolition work.

## 1.8 COORDINATION

A. Arrange selective demolition schedule to avoid interference with Owner's and the school's operations.

## 1.9 WARRANTY

**A.** Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor prior to proceeding. Existing warranties to be provided by Owner prior to the start of construction.

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying existing system has been inspected and warranty remains in effect. Submit supporting documentation at closeout.

# PART 2 PRODUCTS

## 2.1 MATERIALS

A. Repair Materials: Use repair materials identical to existing materials.
1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
2. Use materials whose installed performance equals or surpasses that of existing materials.

B. Comply with material and installation requirements specified in individual Specification Sections.

# PART 3 EXECUTION

## 3.1 EXAMINATION

A. Verify that affected utilities have been disconnected and capped before commencing selective demolition operations.

B. Review Project Record Documents of existing construction or existing condition and hazardous material information provided by Owner. Owner does not warrant existing conditions are same as those indicated in Project Record Documents.

C. Perform an engineering survey of condition of building to determine whether removing an element might result in structural deficiency or unplanned collapse of a portion of structure or adjacent structures during selective building demolition operations.
1. Perform surveys as the work progresses to detect hazards resulting from selective

demolition activities.

D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.

E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

F. Survey of Existing Conditions: Record existing conditions with measured drawings or preconstruction photographs or video and templates.
   1. Inventory and record the condition of items to be removed. Provide photographs or video of conditions that might be misconstrued as damage caused by operations.
   2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final work, make permanent record of measurements, materials, and construction details required to make exact reproduction.
   3. For any electrical or low-voltage work to be performed in the project (including fire alarm, PA, intercom, or data), test entire system for operation prior to initiation of work. Notify Owner of any non-working components. Test entire system at the end of construction to ensure all systems operate properly.

## 3.2 PREPARATION

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

B. Pest Control: Employ certified, licensed exterminator to treat building and to control rodents and vermin before and during selective demolition operations.

C. Site Access and Temporary Controls: Conduct selective demolition and debris removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities. Comply with requirements for access and protection.

D. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
   2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
   3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
   4. Cover and protect furniture, furnishings, and equipment that have not been removed.
   5. Comply with requirements for temporary enclosures, dust control, heating, and cooling.

E. Furnishings and Equipment: Cover and protect furniture, equipment, and fixtures from spoilage or damage as necessary.

F. Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
   1. Construct dustproof partitions of not less than nominal 4 inch (100mm) studs, 5/8 inch (16mm) gypsum wallboard with joints taped on occupied side, and 1/2 inch (13mm) fire retardant plywood on the demolition side.
   2. Insulate partition to provide noise protection to occupied areas.
   3. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
   4. Protect air handling equipment.

5. Weatherstrip openings to prevent the spread of dust.

## 3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off 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. Arrange to shut off utilities with utility companies.
   3. 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.
   4. Disconnect, demolish, and remove fire suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings 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 and leave in place.
      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: 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 and leave in place.

## 3.4 POLLUTION CONTROLS

A. Dust Control: Use water mist, temporary enclosures, and suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations including, Bay Area Air Quality Management District (Fugitive Dust).
   1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
   2. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.

## 3.5 PROTECTION

A. Temporary Protection: Provide temporary barricades and protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
      a. Erect temporary pathways and means of egress necessary for ongoing operations compliant with Code and accessibility regulations.
      b. Provide temporary barricades and protection required to prevent injury and damage to adjacent buildings and facilities to remain.
   2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
   a. Protect existing work which becomes exposed during demolition operations.
   b. Protect adjacent entrances from damage due to demolition activities.
   c. Protect existing improvements, appurtenances, and conditions to remain.
   d. Protect floors with covering.
   e. Protect walls, openings, roofs, and adjacent exterior construction to remain and exposed to building demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 50 00.
   a. Construct temporary insulated dustproof partitions to separate areas from noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks.
   b. Construct dustproof partitions of not less than nominal 4 inch (100mm) studs, 5/8 inch (16mm) gypsum wallboard with joints taped on occupied side, and 1/2 inch (13mm) fire retardant plywood on the demolition side.
   c. Insulate partition to provide noise protection to occupied areas.
   d. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
   e. Protect air handling equipment.
   f. Weatherstrip openings.
6. Damage: Promptly repair damages to adjacent components cause by demolition activities.

B. Temporary Shoring: Design, 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.

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

## 3.6 SELECTIVE DEMOLITION

A. Demolish and remove existing construction to the extent necessary for new work. Use methods required to complete the work within limitations of governing regulations and as follows:
   1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
   2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
   3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame cutting operations. Maintain portable fire suppression devices during flame cutting operations.
   5. Maintain fire watch during and for at least 24 hours after flame cutting operations.
   6. Maintain adequate ventilation when using cutting torches.
   7. Remove decayed, vermin infested, and dangerous or unsuitable materials and promptly dispose of offsite.
   8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

9. Locate selective demolition equipment and remove debris and materials to avoid imposing excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly.

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

C. Removed Items: Clean and pack or crate items after cleaning. Identify contents of containers. Store items in secure area until delivery to Owner.
1. Transport items to Owner's storage area designated by Owner. Protect items from damage during transport and storage.

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

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

F. Patching and Repair: Repair damage to adjacent construction caused by selective demolition operations promptly.

## 3.7 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. At existing parapets, remove portions of roofing, flashing, stone, and masonry necessary to weld new steel and set form work. Provide temporary watertight enclosures over areas of open roof and temporarily flash to make watertight.

B. As column forms are placed, temporarily flash columns to existing roofing and cover with watertight tarpaulins before and after pouring. After column forms have been removed, temporarily flash new concrete structure into existing roofing immediately to maintain watertight roof.

C. When removing roofing to place supports for shoring of form work to transfer loads to existing columns or approved structure or to support scaffolding, work platforms, or similar loads, temporarily flash supports to make roof watertight.

D. Remove excess residue. Thoroughly clean and remove asphalt, dust, loose materials and leave ready for new work.

## 3.8 PATCHING AND REPAIRS

A. Promptly repair damage to adjacent construction caused by selective demolition operations.

B. Patching: Comply with Section 01 73 29.

C. Repairs: When necessary to repair to existing surfaces, patch to produce surfaces suitable for new materials.

1. Fill holes and depressions in existing masonry walls to remain with masonry patching material applied according to manufacturer's written recommendations.

D. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

E. Floors and Walls: Where walls or partitions are demolished, extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
1. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
2. Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.
3. Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

F. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

## 3.9 DISPOSAL OF DEMOLISHED MATERIALS

A. Legally remove demolition waste materials from site and dispose in an EPA approved construction and demolition waste landfill acceptable to authorities having jurisdiction recycle or reuse components.
1. Do not allow demolished materials to accumulate on site.
2. Remove and transport debris to prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or devices that conveys debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

## 3.10 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 02 82 00 ASBESTOS REMEDIATION

## 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 requirements including but not limited to:
   1. Asbestos material abatement and disposal.
   2. Accessories necessary for complete removal.

B. Related Sections:
   1. Refer to Bidding and Contract Documents.

### 1.3 SUBMITTAL

A. Submit copy of the signed waste manifests indicating the place, time, and exact quantity of asbestos received by an approved landfill.

### 1.4 QUALITY ASSURANCE

A. Qualifications: Entity having minimum five (5) years' documented experience, holding required current licenses for the removal, transport, disposal, and related activities relative to the work, having the required personal protective equipment for abatement operations, with current liability insurance, and who employs workers fully trained and knowledgeable in the removal of hazardous materials.

B. Stop Asbestos Removal:
   1. If a verbal or written Stop Asbestos Removal Order is given**,** immediately stop asbestos removal and maintain HEPA filtered negative pressure air flow in the containment and adequately wet any exposed Asbestos Contained Material (ACM).
   2. Do not resume asbestos removal activity until authorized to do so in writing from District.
   3. A stop asbestos removal order may be issued at any time by the District if it is determined that abatement conditions/activities are not within regulatory requirements or that an imminent hazard exists to human health or the environment.
   4. Work stoppage will continue until conditions have been corrected.

## PART 2 MATERIALS (NOT USED)

## PART 3 EXECUTION

### 3.1 REMEDIATION

A. Owner has conducted an asbestos survey and has determined that asbestos may be present in areas where Work will be performed. The survey is made available for review:
   1. As part of the Work, Owner requires asbestos removal to be performed under the construction Contract.
   2. Asbestos may be present in vinyl tile under architectural woodwork or covered by, but

not encapsulated, carpet materials and other types of flooring.
3. Asbestos may be present in the ductwork above the ceiling panels.
4. If asbestos is found, stop work in the area and engage an asbestos removal firm to remediate the asbestos from the area. Do not resume work in the affected areas until the abatement is complete and authorization to proceed with work in the affected areas is given. Work in areas not affected by asbestos may continue.

B. Assume responsibility and liability for compliance with applicable federal, state, and local regulations related to the asbestos abatement work:
1. Provide and maintain training, accreditations, medical exams, medical records, and personal protective equipment (PPE) including respiratory protection and respirator fit testing, as required by applicable federal, state, and local regulations.
2. Post required notices prior to the commencement of the work.
3. Restrict access to containment areas to authorized, trained, and protected personnel.
4. Prepare and post an emergency plan in clean room and equipment room of the decontamination unit.
5. Do not permit workers to eat, drink, smoke, chew gum or tobacco, or break the protection of the respiratory protection system in the work area.

C. Entering and Existing Procedures: Establish procedures for entering and existing containment area. Provide personnel decontainment unit with disposable coveralls, head covers, and clean respirators. Provide shower room between personnel decontainment area and equipment room.

D. Decontamination Procedures: Establish and ensure that procedures for decontamination upon leaving containment area are in accordance with federal and state regulations.

E. Provide negative pressure filtration systems to complete air exchange four (4) times per hour. Provide standby system in the event of a machine failure or emergency:
1. Continuously monitor and record the pressure differential between the work area and the building outside of the work area.

F. Prepare the Affected Area: Remove furnishings and materials to the extent necessary to remediate the asbestos.

G. Containment of Areas:
1. Provide a secure containment work area in accordance with federal and state regulations. Avoid damage to existing partitions and ceilings scheduled to remain to the extent possible:
   a. Establish critical barriers over each opening into the work area.
   b. Close out vents and air ducts to prevent particulates from entering the HVAC system.

H. Debris:
1. Place contaminated debris in a designated location within the containment area:
   a. Place debris in minimum six (6) mil poly bags before removing from contaminated areas. Pass clean or decontaminated bags through a double six (6) mil flap doorway into another bag or fiber drum. Remove to disposal dumpster/gondola/vehicle. Do not permit unprotected personnel to come in contact with contaminated bags.
   b. Remove and dispose of contaminated debris legally.

I. Testing: Perform required tests and inspections upon completion of the work. Collect air samples and analyze in accordance with regulations. Upon satisfactory conclusion of testing, remove critical barriers.

J. After thorough decontamination, complete asbestos abatement work upon meeting the regulated area clearance criteria and fulfilling the following:
   1. Remove equipment, materials, and debris from the Project area.
   2. Package and dispose of asbestos waste, as required.
   3. Repair or replace all interior finishes damaged during the abatement work.
   4. Fulfill other Project closeout requirements as specified elsewhere in this Specification.

## 3.2 CERTIFICATE OF COMPLETION BY CONTRACTOR

A. Submit a signed *Certificate of Completion* at the completion of the abatement and decontamination of the regulated area.

**END OF SECTION 02 82 00**

# SECTION 02 83 00 LEAD-BASED MATERIALS REMEDIATION

## 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 requirements including but not limited to:
   1. Recognition of lead-based material and its definition.
   2. Federal and state requirement reference.
   3. Contractor’s Liability.
   4. Contractor’s Acknowledgment.

B. Related Sections:
   1. Refer to Bidding and Contract Documents.

C. Lead as a Health Hazard:
   1. Lead poisoning is recognized as a serious environmental health hazard facing children today. Even at low levels of exposure - much lower than previously believed - lead can impair the development of a child's central nervous system, causing learning disabilities and leading to serious behavioral problems. Lead enters the environment as tiny lead particles and lead dust disburses when paint chips or chalks peels or wears away over time, or is otherwise disturbed. Ingestion of lead dust is the most common pathway of childhood poisoning; lead dust gets on a child’s hands and toys and then into a child’s mouth through common hand-to-mouth activity. Exposures may result from construction or remodeling activities that disturb lead paint, from ordinary wear and tear of windows and doors, or from friction on other surfaces.
   2. Ordinary construction and renovation or repainting activities carried out without lead-safe work practices can disturb lead-based paint and create significant hazards. Improper removal practices, such as dry scraping, sanding, or water blasting painted surfaces, are likely to generate high volumes of lead dust.
   3. Because Contractor and his employees will be providing services for the District, and because Contractor's work may disturb lead-containing building materials, CONTRACTOR IS HEREBY NOTIFIED of the potential presence of lead-containing materials located within certain buildings utilized by the District. All school buildings built prior to 1978 are presumed to contain some lead-based paint until sampling proves otherwise.
   4. Refer to “Appendix 1: Requirements for Disturbance of Lead” in this Project manual.
   5. Education Code section 32240 et seq. is known as the Lead-Safe Schools Protection Act. Under this act, the Department of Health Services is to conduct a sample survey of schools in the State of California for the purpose of developing risk factors to predict lead contamination in public schools (Ed. Code, § 32241).
   6. Any school that undertakes any action to abate existing risk factors for lead is required to utilize trained and state-certified contractors, inspectors, and workers (Ed. Code, § 32243, sub. [b]). Moreover, lead-based paint, lead plumbing, solders, or other potential sources of lead contamination shall not be utilized in the construction of any new school facility, or the modernization or renovation of any existing school facility (Ed. Code, § 32244).
   7. Both the Federal Occupational Safety and Health Administration (Fed/OSHA) and the California Division of Occupational Safety and Health (Cal/OSHA) have implemented safety orders applicable to all construction work where a contractor's employee may be

occupationally exposed to lead.

8. The OSHA Regulations contain specific and detailed requirements imposed on contractors subject to that regulation. The OSHA Regulations define construction work as work for construction, alteration, and/or repair, including painting and decorating. It includes, but is not limited to, the following:
   a. Demolition or salvage of structures where lead or materials containing lead are present.
   b. Removal or encapsulation of materials containing lead.
   c. New construction, alteration, repair, or renovation of structures, substrates, or portions thereof that contain lead, or materials containing lead.
   d. Installation of products containing lead.
   e. Lead contamination/emergency cleanup.
   f. Transportation, disposal, storage, or containment of lead or materials containing lead on the site or location at which construction activities are performed.
   g. Maintenance operations associated with the construction activities described within this Section.
9. Because it is assumed by the District that a portion of painted surfaces (interior as well as exterior) within the District contain some level of lead, it is imperative that Contractor, workers, and subcontractors fully and adequately comply with all applicable laws, rules, and regulations governing lead-based materials, including title 8, California Code of Regulations, section 1532.1.
10. Contractor shall notify the District if any Work may result in the disturbance of lead-containing building materials. Any and all Work that may result in the disturbance of lead-containing building materials shall be coordinated through the District. A signed copy of this Certification shall be on file prior to beginning Work on the Project, along with all current insurance certificates.

D. Renovation, Repair, and Painting Rule:
   1. Toxic Substance Control Act Section 402(a):
      a. The EPA requires lead safe work practices to reduce exposure to lead hazards created by renovation, repair, and painting activities that disturb lead-based paint. Pursuant to the Renovation, Repair and Painting Rule (RRP), renovations in homes, childcare facilities, and schools built prior to 1978 must be conducted by certified renovations firms, using renovators with training by a EPA-accredited training provider, and fully and adequately complying with all applicable laws, rules, and regulations governing lead-based materials, including those rules and regulations appearing within title 40 of the Code of Federal Regulations as part 745 (40 CFR 745).
      b. The RRP requirements apply to all contractors who disturb lead-based paint in a six (6) square foot or greater area indoors or a 20 square foot or greater area outdoors. If a DPH-certified inspector or risk assessor determines that a structure constructed before 1978 is lead-free, the federal certification is not required for anyone working on that particular building.

## 1.3 SUBMITTAL

A. Contractors Acknowledgment (bottom of Section).

B. Submit copy of the signed waste manifests indicating the place, time, and exact quantity of material received by an approved landfill.

## 1.4 CONTRACTOR'S LIABILITY

A. If Contractor fails to comply with any applicable laws, rules, or regulations, and that failure results in a site or worker contamination, Contractor will be held solely responsible for all costs involved in any required corrective actions, and shall defend, indemnify, and hold

harmless the District, pursuant to the indemnification provisions of the Contract, for all damages and other claims arising therefrom.

B. If lead disturbance is anticipated in the Work, only persons with appropriate accreditation, registrations, licenses, and training shall conduct this Work.

C. It shall be the responsibility of Contractor to properly dispose of any and all waste products, including, but not limited to, paint chips, any collected residue, or any other visual material that may occur from the prepping of any painted surface. It will be the responsibility of Contractor to provide the proper disposal of any hazardous waste by a certified hazardous waste hauler. This company shall be registered with the Department of Transportation (DOT) and shall be able to issue a current manifest number upon transporting any hazardous material from any Project site.

D. Contractor shall provide the District with any sample results prior to beginning Work, during the Work, and after the completion of the Work. The District may request to examine, prior to the commencement of the Work, the lead training records of each employee of Contractor.

**SECTION CONTINUES ON NEXT PAGE**

**CONTRACTOR HEREBY ACKNOWLEDGES UNDER PENALTY OF PERJURY THAT IT:**

1. HAS RECEIVED NOTIFICATION OF POTENTIAL LEAD-BASED MATERIALS ON OWNER'S PROPERTY;

2. IS KNOWLEDGEABLE REGARDING AND WILL COMPLY WITH ALL APPLICABLE LAWS, RULES, AND REGULATIONS GOVERNING WORK WITH, AND DISPOSAL OF, LEAD.

THE UNDERSIGNED WARRANTS THAT HE/SHE HAS THE AUTHORITY TO SIGN ON BEHALF OF AND BIND CONTRACTOR. THE DISTRICT MAY REQUIRE PROOF OF SUCH AUTHORITY.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

PROJECT/CONTRACT NO.: _____ (Project or Contract)

between SRCS District and _____ (Contractor or Bidder).

This certification provides notice to Contractor that:

1. Contractor's work may disturb lead-containing building materials.

2. Contractor shall notify the District if any work may result in the disturbance of lead-containing building materials.

3. Contractor shall comply with the Renovation, Repair, and Painting Rule, if lead-based paint is disturbed in a six (6) square-foot or greater area indoors or a 20-square-foot or greater area outdoors.

**END OF SECTION 02 83 00**

# SECTION 06 10 00 ROUGH CARPENTRY

## PART 1 GENERAL

### 1.1 DESCRIPTION:

A. Work Included: Rough carpentry, light hardware and miscellaneous items of work not included in another Section. This Section also includes:
   1. Structural wood supports, grounds, backing and blocking required for roof related construction.

B. Related Work Specified Elsewhere:
   1. Section 06 16 00: Sheathing.
   2. Section 07 21 00; Thermal Insulation.
   3. Section 07 52 19; Modified Bitumen Membrane Roofing System.
   4. Section 07 72 00; Roof Accessories.
   5. Section 07 92 00; Joint sealants.
   6. Section 09 21 16; Gypsum Board.

### 1.2 REFERENCES, CODES AND STANDARDS:

A. The following references, codes and standards are hereby made a part of this Section and carpentry work shall conform to applicable requirements therein except as otherwise specified herein or shown on the Drawings. Nothing contained in the Drawings or these Specifications shall be construed as permitting work which is contrary to code requirements.

B. "Standard Grading and Dressing Rule #16, of the West Coast Lumber Inspection Bureau".

C. "Grading Rules for Western Lumber" of the Western Wood Products Association.

D. "Standard Specifications for Grades of California Redwood Lumber" of the Redwood Inspection Service.

E. American Wood Preservers Assn. (AWPA) Standard C 2-77, "Lumber, Timbers, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes".

F. American Wood Preservers Bureau (AWPB) Quality Control Standards.

### 1.3 QUALITY ASSURANCE:

A. Lumber and plywood shall be grade or quality marked by WWPA, WCLIB, APA, AWPB or by other grading and inspection agencies acceptable to the Architect. Grade marks shall include the designation "S-DRY"(or "MC-15" as applies) where applicable. Grade and quality marks shall not be apparent on surfaces exposed in the finished work.

### 1.4 PRODUCT STORAGE:

A. Store kiln dried materials in enclosed areas, protected from moisture and separated from contact with concrete or soil.

## PART 2 PRODUCTS

### 2.1 MATERIALS:

A. Temporary Construction: Clean lumber at Contractor's option, rough or smooth, as usage requires.

B. Lumber Not Otherwise Specified or Noted: Douglas fir or larch, graded and grade marked according to Reference Standard 1.02 A or B, #1 grade.
   1. Boards: Construction Grade.

C. Plywood for roofs - as noted on plans.
   1. Plywood shall be fabricated with exterior glue.

D. Rough Hardware: Nails, spikes, bolts, screws, tacks and framing connectors of standard manufacture as required. Hot dip galvanize items exposed to moisture or to exterior and those items which are in contact with wood pressure treated with waterborne salts.
   1. Bolts and Nuts: ASTM A 307, Grade A.
   2. Lag Bolts: Fed. Spec. FF-B-561. Pre-drill per CBC.
   3. Nails: Fed. Spec. FF-N-101, common unless otherwise noted or specified.
   4. Joist Hangers and Framing Connectors: Simpson or approved equal.

E. Building Paper and Felt: Kraft waterproof building paper or 15# unperforated asphalt saturated rag felt per CBC Standard 14-1

F. Framing connectors: Simpson Strong Tie Corp., or equal.

**2.2 MOISTURE CONTENT:**

A. 19% maximum for 2x thickness and less; 19% maximum for ¾" thickness greater than 2x and less than 4x; and 22% maximum for thickness greater than 4x.

**2.3 SIZES:**

A. Surfaced to "DRY" sizes. Sizes noted are nominal unless shown as net.

***2.4*** **SURFACING:**

A. All wood materials exposed in the finished work shall have resawn surfaces of clean natural color unless noted or specified otherwise. Concealed framing lumber shall be S4S.

**PART 3 EXECUTION**

**3.1 ERECTION AND INSTALLATION: CODE REFERENCES REFER TO CBC CODE.**

A. Framing: Conform to CBC where same covers points not indicated on Drawings. Properly lay out framing with pieces closely fitted, accurately plumbed, leveled and aligned and rigidly secured in place.

B. Except as specifically shown on Structural Drawings, cutting of all wood, etc., is limited to those cuts permitted by CBC.

C. Bridging and Blocking: Conform to CBC. Provide 2X blocking at intersections of finished surfaces for adequate bearing and at points where required to support fixtures, cabinets, hardware and other equipment mounted on walls.

D. Plywood (General): Unless more stringent requirements are indicated on the Drawings or required by Code, application of plywood shall be in accordance with recommendations of the American Plywood Association.

E. Connections and Fastenings: Conform to CBC. Unless otherwise specified or shown on the Drawings, conform to minimum nailing requirements of CBC. For bolted connections, provide washers under heads and nuts bearing on wood, and draw nuts tight. Retighten before closing in framing. Exercise care in nailing through exposed sheathing and siding and ensure that fasteners penetrate into framing members.

**END OF SECTION 06 10 00**

# SECTION 06 10 53 MISCELLANEOUS ROUGH CARPENTRY

## PART 1 GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Framing with dimension lumber.
   2. Rooftop equipment bases and support curbs.
   3. Wood blocking, cants, and nailers.
   4. Wood furring and grounds.
   5. Wood sleepers and platform wood flooring.
   6. Plywood backing panels.
   7. Accessories necessary for a complete installation.

### 1.3 DEFINITIONS

A. Boards or Strips: Lumber of less than two inches (2”) nominal (38 mm actual) size in least dimension.

B. Dimension Lumber: Lumber of two inches (2”) nominal (38 mm actual) or greater size but less than five inches (5”) nominal (114 mm actual) size in least dimension.

### 1.4 SUBMITTALS

A. Product Data:
   1. Submit each type of process and factory fabricated product. Indicate component and materials and dimensions and include construction and application details:
      a. Wood treatment:
         1) Submit data for wood preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained:
            a) Include data for fire retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by qualified independent testing agency.
            b) For fire retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
            c) For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to site.

B. Laboratory and Testing Reports:
   1. Laboratory test reports:
      a. Submit report for installation adhesives indicating compliance with requirements for low emitting materials.

b. Post installed anchors.
c. Metal framing anchors.

## 1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Building code: Comply with applicable requirements of CBC Chapter 23 for miscellaneous wood.
2. Fire retardant treated lumber and plywood by pressure process: Provide products with a flame spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
3. Level floor finishes to minimum requirement noted CBC Section 11B-302.1.

B. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

# PART 2 PRODUCTS

## 2.1 WOOD PRODUCTS

A. Lumber:
1. DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated:
a. Factory mark each piece of lumber with grade stamp of grading agency.
b. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
c. Dress lumber, S4S, unless otherwise indicated.
d. Maximum moisture content of lumber: 19 percent unless otherwise indicated.

B. Preservative Treatment by Pressure Process:
1. AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground:
a. Preservative chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
b. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
c. Kiln dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
d. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

e. Application - treat items indicated on Drawings and the following:
   1) Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
   2) Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

C. Fire Retardant Treatment:
   1. Where indicated as fire retardant treated, provide materials acceptable to authorities having jurisdiction, and with fire test response characteristics specified as determined by testing identical products per ASTM E84 by a qualified testing agency:
      a. Treatment shall not promote corrosion of metal fasteners.
      b. Exterior type: Comply with specified requirements for fire retardant treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
      c. Interior Type A: Provide treated materials with moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
      d. Design value adjustment factors:
         1) Test treated lumber according to ASTM D5664 and calculate design value adjustment factors according to ASTM D6841:
            a) For enclosed roof framing, framing in attic spaces, and where high temperature fire retardant treatment is indicated, provide material with adjustment factors of minimum 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for climatological zone.
      e. Kiln dry lumber after treatment to a maximum moisture content of 19 percent.
      f. Identify fire retardant treated wood with appropriate classification marking of qualified testing agency:
         1) For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
      g. Application:
         1) Treat items indicated on Drawings and the following:
            a) Framing for raised platforms.
            b) Concealed blocking.
            c) Roof framing and blocking.
            d) Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
            e) Plywood backing panels.
            f) Wood platform deck flooring.

D. Dimension Lumber Framing:
   1. Non load bearing interior partitions: Construction or No. 2 grade of any species.
   2. Other framing: Construction or No. 2 grade of any species.

E. Miscellaneous:
   1. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including but not limited to blocking, nailers, cants, grounds, furring, roof top equipment bases and support curbs, and utility shelving:
      a. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content of any species.
      b. For blocking not used for attachment of other construction, use utility, stud, or No. 3 grade lumber of any species provided that it is cut and selected to eliminate defects that interfere with attachment and purpose.
      c. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that interfere with attachment of work.
      d. For furring strips for installing plywood or hardboard paneling, select boards with

no knots capable of producing bent-over nails and damage to paneling.

e. Utility shelving:
   1) Lumber with 19 percent maximum moisture content of any of the following species and grades:
      a) Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Premium or No. 2 Common (Sterling) grade; NeLMA, NLGA, WCLIB, or WWPA.
      b) Mixed southern pine or southern pine No. 2 grade; SPIB.
      c) Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

F. Concealed Boards:
   1. 19 percent maximum moisture content of any of the following species and grades:
      a. Mixed southern pine or southern pine, No. 2 grade; SPIB.
      b. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
      c. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
      d. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
      e. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

G. Plywood Backing Panels (Sleepers):
   1. Equipment backing panels: Plywood, DOC PS 1, Exterior, C-C Plugged or Exposure 1, C-D Plugged, fire retardant treated, in thickness not less than 3/4 inch (19 mm) nominal thickness.

H. Fasteners:
   1. Provide fasteners of size and type indicated that comply with requirements:
      a. Where carpentry is exposed to weather, in ground contact, pressure preservative treated, or in area of high relative humidity, provide fasteners with hot dip zinc coating complying with ASTM A153/A153M.
      b. Nails, brads, and staples: ASTM F1667.
      c. Screws for fastening to metal framing: ASTM C1002 drywall type or ASTM C954 nonload bearing steel stud, length recommended by screw manufacturer for material being fastened.
      d. Power driven fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
      e. Post installed anchors:
         1) Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 mechanical, masonry, ICC-ES AC58 mechanical, concrete, ICC-ES AC193 adhesive, masonry, or ICC-ES AC308 adhesive, concrete as appropriate for the substrate:
            a) Material, interior: Carbon steel components, zinc plated to comply with ASTM B633, Class Fe/Zn 5.
            b) Material, exterior: Stainless steel with bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2.

I. Metal Framing Anchors:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. Cleveland Steel Specialty Co.
      b. KC Metals Products, Inc.

c. Phoenix Metal Products, Inc.
d. Simpson Strong-Tie Co., Inc.

2. Galvanized steel sheet: Hot dip, zinc coated steel sheet complying with ASTM A653/A653M, G60 (Z180) coating designation. Use for interior locations unless otherwise indicated.
3. Hot dip, heavy galvanized steel sheet - ASTM A653/A653M; structural steel (SS), high strength low alloy steel Type A (HSLAS Type A), or high strength low alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick. Use for wood preservative-treated lumber and where indicated:
   a. Stainless steel sheet: ASTM A666, Type 304 and Type 316 for exposed application in coastal environments. Use for exterior locations and where indicated.

J. Miscellaneous Materials:
1. Adhesives for gluing to concrete or masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.
2. Flexible flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized asphalt compound, bonded to high density polyethylene film, aluminum foil, or spunbonded polyolefin to produce overall thickness of not less than 0.025 inch (0.6 mm).

## PART 3 EXECUTION

### 3.1 INSTALLATION

A. Framing Standard: Comply with AF&PA WCD 1 Details for Conventional Wood Frame Construction unless otherwise indicated.

B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels:
1. Install fire retardant treated plywood backing panels with classification marking of testing agency exposed to view.

D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

E. Do not splice structural members between supports unless otherwise indicated.

F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim:
1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.

G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2,438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks

of same width as framing members and two-inch nominal (2") (38-mm actual) thickness.
3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 square feet (9.3 sq. m) and to solidly fill space below partitions.
4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet (6 m) o.c.

H. Sort and select lumber so natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

I. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative treated lumber:
1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

J. Where wood preservative treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

K. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. Table 2304.9.1 Fastening Schedule in the International Building Code.
2. ICC-ES evaluation report for fastener.

L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

M. Wood Blocking and Nailer Installation:
1. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved:
   a. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
   b. Provide permanent grounds of dressed, pressure preservative treated, key beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

## 3.2 SITE ENVIRONMENTAL PROCEDURES

A. Indoor Air Quality: Provide temporary ventilation during work. During and immediately after installation of treated wood, engineered wood products, and laminated wood products at interior spaces, provide temporary ventilation.

B. Waste Management:
1. Refer to Construction Waste Management and Disposal, and Construction Waste Management Plan from District:
   a. Select lumber sizes to minimize waste; reuse scrap lumber to the greatest extent possible. Clearly separate scrap lumber for use onsite as accessory components, including shims, bracing, and blocking.
   b. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

c. Prevent sawdust and wood shavings from entering the storm drainage system.
d. Do not burn scrap lumber that has been pressure treated.
e. Do not send lumber treated with pentachlorophenol, CCA, or ACA to cogeneration facilities or waste to energy facilities.

## 3.3 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron treated wood becomes wet, apply EPA registered borate treatment. Apply borate solution by spraying to comply with EPA registered label.

B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA registered borate treatment. Apply borate solution by spraying to comply with EPA registered label.

**END OF SECTION 06 10 53**

# SECTION 06 16 00 SHEATHING

## PART 1 GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Wall sheathing.
   2. Underlayment.
   3. Sheathing joint and penetration treatment.
   4. Accessories necessary for a complete installation.

### 1.3 SUBMITTALS

A. Product Data:
   1. Technical data for each type of process and factory fabricated product. Indicate component materials and dimensions and include construction and application details:
      a. Include data for wood preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
      b. Include data for fire retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
      c. For fire retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5516.
      d. For products receiving a waterborne treatment, include statement that moisture content of treated materials reduced to levels specified before shipment to Project site.
      e. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

### 1.4 QUALITY ASSURANCE

A. Fire Test Response Characteristics:
   1. For assemblies with fire resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E119 by a testing and inspecting agency acceptable to authorities having jurisdiction:
      a. Fire resistance ratings: Indicated by design designations from UL Fire Resistance Directory or GA-600 Fire Resistance Design Manual.

B. Testing Agency Qualifications: For testing agency providing classification marking for fire retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

### 1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

## PART 2 PRODUCTS

### 2.1 MATERIALS

A. Plywood: DOC PS 1.

B. Oriented Strand Board: DOC PS 2.

C. Thickness: As necessary to comply with requirements specified, but not less than thickness indicated.

D. Factory mark panels to indicate compliance with applicable standard.

### 2.2 PRESERVATIVE TREATED PLYWOOD

A. Preservative Treatment by Pressure Process - AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground:
   1. Preservative chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

### 2.3 FIRE RETARDANT TREATED PLYWOOD

A. Where fire retardant treated materials are indicated, use materials complying with requirements acceptable to authorities having jurisdiction and with fire test response characteristics specified determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire Retardant Treated Plywood by Pressure Process:
   1. Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test:
      a. Use treatment that does not promote corrosion of metal fasteners.
      b. Exterior type: Treated materials shall comply with requirements specified above for fire retardant treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
      c. Design value adjustment factors: Treated lumber plywood shall be tested according to ASTM D5516 and design value adjustment factors shall be calculated according to ASTM D6305. Span ratings after treatment shall be not less than span ratings specified. For roof sheathing and where high temperature fire retardant treatment is indicated, span ratings for temperatures up to 170 degrees F (76 degrees C) shall be not less than span ratings specified.

C. Kiln dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

D. Identify fire retardant treated plywood with appropriate classification marking of qualified testing agency.

E. Application:
   1. Treat plywood indicated on Drawings and the following:
      a. Roof and wall sheathing within 48 inches (1,220 mm) of fire walls.
      b. Subflooring and underlayment for raised platforms.

## 2.4 WALL SHEATHING

A. Glass Mat Gypsum Wall Sheathing - ASTM C1177/C1177M:
   1. Product is subject to compliance with requirements; provide products by one of the following:
      a. CertainTeed Corporation: GlasRoc (basis of design).
      b. Georgia Pacific: Dens-Glass.
      c. National Gypsum Company: Gold Bond eXP.
      d. United States Gypsum Co.: Securock.
   2. Type and thickness: Regular, 1/2 inch (12.7 mm) thick.
   3. Size: Four feet by eight feet (1,220 mm by 2,440 mm) for vertical installation.

## 2.5 SUBFLOORING AND UNDERLAYMENT

A. Plywood Combination Subfloor Underlayment - DOC PS 1, Exterior, Structural I, C-C Plugged Single Floor Panels:
   1. Span rating: Not less than 20 o.c.
   2. Nominal thickness: Not less than one inch (25 mm).
   3. Edge detail: Tongue and groove.
   4. Surface finish: Fully sanded face.

B. Underlayment: Provide underlayment in nominal thickness not less than 1/4 inch (6.4 mm) over smooth subfloors and not less than 3/8 inch (9.5 mm) over board or uneven subfloors.

C. Sound Deadening Board - Class C Fire Rated, Molded, Recycled Post-Consumer Paper, Cellulose Fiber Structural Panel:
   1. Density: 26 pcf to 28 pcf (416 = 448 kg/cu.m) tested in accordance with ASTM C209.
   2. Tensile strength - when tested in accordance with ASTM C209:
      a. Parallel: 450 - 700 psi (3,100 - 4,830 kPa).
      b. Transverse: 750 - 1--- psi (5.1171 - 6.894 kPa).
   3. Hardness (Janka Ball): 230 pounds (104 kg) tested in accordance with ASTM D1037.
   4. Water absorption by volume, when tested in accordance with ASTMC209:
      a. Two-hour immersion: Maximum seven percent (7%).
   5. Expansion: 50 percent to 90 percent relative humidity, 0.25 percent in accordance with ASTM C209.
   6. Noise reduction coefficient (NCR): 0.20.
   7. Flame spread: Maximum 75 tested in accordance with ASTM E84 Class C.
   8. Thickness: 3/4 inch (19 mm).

## 2.6 FASTENERS

A. Provide fasteners of size and type indicated that comply with requirements specified for material and manufacture. Provide fasteners with hot dip zinc coating complying with ASTM A153/A153M.

B. Nails, Brads, and Staples: ASTM F1667.

C. Power Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening Gypsum Sheathing to Cold Formed Metal Framing:
   1. Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic polymer or corrosion protective coating having salt spray resistance of more than 800 hours according to ASTM B117:
      a. For steel framing less than 0.0329 inch (0.835 mm) thick, use screws that comply with ASTM C1002.

## 2.7 SHEATHING JOINT AND PENETRATION TREATMENT MATERIALS

A. Sealant for Glass Mat Gypsum Sheathing:
   1. Silicone emulsion sealant complying with ASTM C834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass fiber sheathing tape and for covering exposed fasteners:
      a. Sheathing tape: Self-adhering glass fiber tape, minimum two inches (50 mm) wide, ten by ten or ten by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass mat gypsum sheathing and with history of successful in-service use.

## 2.8 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Framing: Formulation complying with ASTM D3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

# PART 3 EXECUTION

## 3.1 INSTALLATION

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three (3) support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated.

D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate wall and roof sheathing installation with flashing and joint sealant installation so materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

## 3.2 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions. Fasten gypsum sheathing to cold formed metal framing with screws. Install boards with a 3/8-inch (9.5 mm) gap where non-load bearing construction abuts structural elements. Install boards with a 1/4-inch (6.4 mm) gap where they abut masonry or similar materials that retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Vertical Installation:
   1. Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud:
      a. Space fasteners approximately eight inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of boards.

D. Seal sheathing joints according to sheathing manufacturer's written instructions. Apply glass fiber sheathing tape to glass mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal penetrations and openings.

**END OF SECTION 06 16 00**

SECTION 07 52 16

SBS MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Modified Bituminous Membrane Roofing
2. Nails and Fastener
3. Copping and Flashing: For areas immediately adjacent to roofing membrane.

1.02 REFERENCES

A. American Society of Civil Engineers (ASCE):

1. ASCE 7-05, Minimum Design Loads for Buildings and Other Structures.

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

1. ASTM 0451 Standard Test Method for Sieve Analysis of Granular Mineral Surfacing for Asphalt Roofing Products.
2. ASTM D 1079 Standard Terminology Relating, to Roofing, Waterproofing and Bituminous Materials.
3. ASTM D 1227 Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.
4. ASTM D1863 Standard Specification tor Mineral Aggregate Used as a Protective Coating for Roofing.
5. ASTM D4S86 Standard Specification for Asphalt Roof Cement.
6. ASTM D2824 Standard Specification for Aluminum-Pigmented Asphalt Roof Coating.
7. ASTM DSI47 Standard Test Method for Sampling and Testing Modified Bituminous Sheet Materials.
8. ASTM D6162 Standard Specification tor Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.
9. ASTM D6163 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
10. ASTM E108 Standard Test Methods for Fire Test of Roof Coverings.

C. Factory Mutual Research (FM):

1. Roof Assembly Classifications.

D. National Roofing Contractors Association (NRCA):

1. Roofing and Waterproofing Manual.

E. Underwriters Laboratories, Inc. (UL):

1. Fire Hazard Classifications.

F. Warnock Hersey (WH):

1. Fire Hazard Classifications.

1.03 SUBMITTALS

A. Product Data:

1. Submit manufacturer product data for all products necessary for completion of roofing system and as specified including manufacturer's technical product data, installation instructions and recommendations for each type of roofing product required. Include data substantiating that materials comply with minimum specified requirements.

B. Test Data and Certifications:

1. Submit independent test data according to ASTM designation D-SI47-91 "Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material", substantiating that materials comply with specified requirements.

2. Submit independent test data that indicates the cap sheet complies with CRCC and title 24 requirements.

3. Submit certification that the roof system furnished is approved by Factory Mutual, Underwriters Laboratories, or Warnock Hersey for external fire E-108 Class lA and that the roof system is adhered properly to meet or exceed 1-90.

4. Submit copy of ISO 9001 certified compliance.

C. Calculations:

1. Submit engineered wind-uplift calculations, stamped by a registered California engineer, that membrane manufacturer warranting wind uplift speeds of up to 90 mph for all components of field assembly and perimeter flashing systems.

D. Manufacturer Qualification’s:

1. Submit list of facilities where the proposed material has been used in a similar roofing system as that which is specified and within one hundred mile radius from the location of the specified job. Include a minimum of three projects at least three years old and that are available for OUSD to inspect.

2. Submit manufacturer’s inspector qualifications with certification to perform inspections signed by an officer of the company for this specific project. Also, show evidence that roofing manufacturer has five years of experience performing daily site inspections during construction and preparing daily inspection reports with a full time employee of that manufacturer. Contact information will be required for verification.

E. Installer Qualifications:

1. Submit installer qualifications; refer to Quality Assurance article below.

F. Samples:

1. Submit samples of each product being proposed for use. Provide a wet sample of the membrane adhesive and provide third party testing for zero VOC membrane adhesive.

G. Warranty:

1. Submit unexecuted Manufacturer's Thirty-year High-Performance Edge-to-Edge No Dollar Limit (NDL) warranty covering LABOR AND MATERIALS for ALL components of the roofing system required against leaks, edge to edge (perimeter metal) and deck up (all base sheets, flashing components and insulation. Warranty covers: Metal Coping, Counter flashing, and Edge metal where applicable, insulation, base ply, cap, coating, lead flashings, and any and all miscellaneous roof flashings.

H. Shop Drawings:

1. Submit manufacturer engineered stamped shop drawings, layouts, and coordinated details.

1.04 QUALITY ASSURANCE REQUIREMENTS

A. Manufacturer Qualifications: Roofing system manufacturer shall have a minimum of 30 years' experience in manufacturing bitumen roofing products in the United States and be ISO 9001 certified and Manufacturer must have local references and have 5 years' experience in daily site inspections and daily inspection reports forwarded to manufacturer.

B. Installer Qualifications: Installer (Roofer) shall be specializing in modified bituminous roof application with minimum 10 years' experience and who is currently approved (within the last three years) by the roofing system manufacturer as qualified to install manufacturer's roofing materials.

C. Installer's Field Supervision: Require Installer to maintain a full-time Supervisor/Foreman on job site during all phases of bituminous sheet roofing work and at any time roofing work is in progress, proper supervision of workmen shall be maintained. In addition, a minimum two-hour fire watch is required on each day that torch applied membranes are installed. A copy of the specification shall be in the possession of the Supervisor/Foremen and on the roof at all times.

D. It shall be the General Contractor / Roof Contractor's responsibility to respond immediately to correction of roof leakage during construction. If the Roof Contractor does not respond within 24 hours, OUSD has the right to hire a qualified Roof Contractor and back charge the original General Contractor / Roof Contractor.

E. Pre-application Roofing Conference: Before scheduled commencement of modified bitumen roof system installation and associated work meet at project site with installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in the around roofing must precede or follow roofing work (including mechanical work if any), OUSD, roofing system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) OUSD's insurers, test agencies, and governing authorities.

1. Objectives to include:

a. Review foreseeable methods and procedures related to roofing work.

b. Tour representative areas of roofing substrates (decks), inspect, accept or identify any deficiencies of substrate, roof drains, curbs, penetrations and other preparatory work performed by other trades.

c. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.

d. Review roofing system requirements (drawings, specifications and other contract documents).

e. Review approved submittals and shop drawings.

f. Review and finalize construction schedule related to roofing work and verify availability of material, Installer's personnel, equipment and facilities needed to make progress and avoid delays.

g. Review required inspection, testing, certifying and material usage accounting procedures.

h. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not mandatory requirement).

i. Record (contractor) discussion of conference including decisions and agreements (or disagreements) reached and furnish copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.

j. Review notification procedures for weather or non-working days.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged. Any damaged material to be noted at delivery and returned at no cost to OUSD.

B. Store and handle roofing sheets in a dry, well-ventilated, weather-tight place to ensure no possibility of significant moisture exposure. Store rolls of felt and other sheet materials on pallets or other raised surface. Stand all roll materials on end. Cover roll goods with a canvas tarpaulin or other breathable material (not polyethylene).

C. Do not leave unused materials on the roof overnight or when roofing work is not in progress unless protected from weather and other moisture sources.

1.06 MANUFACTURER’S DUTIES TO DISTRICT

A. During the installation of the roofing, the Manufacturer will provide the following:

1. Keep DISTRICT informed as to the progress and quality or the work as observed.

2. Job site inspections a minimum of five days a week. Daily inspection reports sent to OUSD representatives and contractor each day.

3. Report in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.

4. Confirm after completion of the project that no application procedures are in conflict with the specifications other than those that may have been previously reported and corrected.

5. A qualified roofing inspector to conduct inspections of the roofing installation on the project.

B. Upon completion of the project, the Manufacturer will provide the following:

1. Provide warranty to DISTRICT at no additional charge.

2. Provide a minimum of two inspections annually of the roof during the warranty period. Notify OUSD prior to any inspections. Provide a written report of findings and schedule of work and or repairs, if any should be necessary, within 10 days of inspection.

3. Provide all future necessary work and or repairs at no cost to OUSD. Manufacturer to acknowledge this requirement with a signed document from an officer of the company.

1.07 PROJECT CONDITIONS

A. Weather Condition Limitations: Do not apply roofing membrane during inclement weather or when a 40% change of precipitation is expected.

B. Do not apply roofing insulation or membrane to damp deck surface.

C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

D. Proceed with roofing work only when existing and forecasted weather conditions will permit unit of work to be installed in accordance with manufacturer's recommendations and warranty requirements.

E. All slopes greater than 2: 12 require back-nailing to prevent slippage of the ply sheets. Use ring or spiral-shank one (1) inch cap nails, or screws and plates at a rate of one (1) fastener per ply (including the membrane) at each insulation stop. When slope exceeds 2:12, install all plies parallel to the slope (strapping) to facilitate back nailing. Install four (4) additional fasteners at the upper edge of the membrane when strapping the plies.

1.08 SEQUENCING AND SCHEDULING

A. Sequence installation of modified bituminous sheet roofing with related units of work specified in other sections to ensure that roof assemblies including roof accessories, flashing, trim and joint sealers are protected against damage from effects of weather, corrosion and adjacent construction activity.

B. All work must be fully completed on each day. Phased construction will not be acceptable.

1.09 WARRANTY

A. Roofing Contractor will provide a minimum of a five year no limit warranty to the membrane manufacturer with a copy directly to OUSD.

B. Manufacturer will provide manufacturer's Thirty Year High-Performance No Dollar Limit (NDL) warranty covering 100% labor and materials for all components installed by roofing contractor.

C. Membrane manufacture will provide a minimum of two inspections annually or the roof for the entire warranty period and will provide all work necessary for warranty at no cost to OUSD.

D. Single source warranty from the manufacturer covering all membranes, coatings and specified perimeter roof flashings in other sections that meet ANSI SPRI ES I code requirements.

PART 2 – PRODUCTS

2.01 GENERAL

A. The design is based upon the OUSD Board Approved Standard Roofing system engineered and manufactured by The Garland Company or approved equal:

The Garland Company
3800 East 91st Street
Cleveland, Ohio 44105
Miles Taylor
310-367-7655

2.02 DESCRIPTION

A. Modified bituminous roofing materials:

1. Torch Grade Base Sheet – High Performance Roofing (HPR) Torch Base Sheet fully adhered to approved torchable substrate with roofer's torches.
2. Minimum of two plies in the field and three in the angles.
3. All flashings will include one ply of SBS Torch Grade Base sheet – HPR Torch Base Sheet and one ply of SBS Torch Modified Membrane.
4. The modified membrane cap sheet.
5. Flashing Bond - Mastic

2.03 SHEET MATERIALS - PERFORMANCE CHARACTERISTICS

A. Styrene-Butadiene-Styrene (SBS) Roofing Membrane:

1. ASTM D 6163 Type III Grade G
2. Tensile Strength (ASTM D-5147)
   a. 2 in/min.@ 73.41+/- 3.6°F MD 310 lbf/in CMD 310 lbf/in
   b. 50 mm/min. @ 23 +/- 3°C MD 54.25 kNm CMD 54.25 kNm
3. Tear Strength (ASTM D-5147)
   a. 2 in/min.@ 73.41+/- 3.6°F MD510lbf CMD 510 lbf

b. 50 mm/min. @ 23 +/- 3°C MD 2269N CMD 22269 N

4. Elongation at Maximum Tensile (ASTM D-5147)

a. 2 in/min. @ 73.4+/- 3.6°F MD 6.0% CMD 6.0%

b. 50 mm/min. @ 23 +/- 3°C

5. Low Temperature Flexibility (ASTM D-5147) Passes -40°F (-23°C)

B. High Performance Roofing (HPR) Torch Base Sheet

1. Tensile Strength (ASTM D-5147)

a. 2 in/min. @ 73.4+/- 3.6°F MD 210 lbf/in

2. Tear Strength (ASTM D-5147)

a. 2 in/mn. @ 73.4+/- 3.6°F MD 250 lbf

3. Elongation at Maximum Tensile (ASTM D-5147)

a. 2 in/min.@ 73.4+/- 3.6°F MD 4.0%

2.04 SURFACINGS

A. No Surface Coating accepted except in waterways and drain areas. Cap Sheet UV Minerals, cap sheet must be title 24, CRCC certified.

1. Reflectance .73

2. Emittance .89

3. SRI 90

2.05 RELATED MATERIALS

A. Nails and Fasteners: Non-ferrous metal or galvanized steel, except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel, r addition plates should be used. Fasteners shall be self-clinching type of penetrating type as recommended by the manufacturer of the deck material. Nails and fasteners shall be flush-driven through flat metal discs of not less than one (1) inch diameter. Omit metal discs when one-piece composite nails or fasteners with heads not less than one (1) inch diameter are used.

B. Walkway Pads: As recommended and furnished by the membrane manufacturer set in approved adhesive to control foot traffic on rooftop surface and give a durable system compliant non-slip walkway.

C. Walkway Pad Adhesive: Adhesive used to adhere approved walk way pads as recommended and furnished by the membrane manufacturer.

D. Coping Cap Metal: 22 gauge, galvanized, Kynar coated coping cap sheet metal. Must meet ANSI SPRI ES I code requirement and be manufactured and warranted by membrane manufacturer.

E. Butyl Tape: 100% solids, asbestos free and compressive tape designed to seal as recommended and furnished by the membrane manufacturer.

F. 4lb lead Jacks for flashing penetrations, no lead will be accepted on this project.

## PART 3 – EXECUTION

### 3.01 EXAMINATION

A. Examine substrate surfaces to receive modified bitumen sheet roofing system and associated work and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected in a manner acceptable to Roof System Manufacturer and Installer.

### 3.02 GENERAL INSTALLATION REQUIREMENTS

A. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing the roof system.

B. Insurance/Code Compliance: Where required, install and test the roofing system to comply with governing regulation and specified insurance requirements.

C. Protect other work from spillage of roofing materials and prevent materials from entering or clogging drains and conductors. Replace or restore other work damaged by installations of the modified bituminous roofing system work.

D. Coordinate installing roofing system components so that insulation and roofing plies are not exposed to precipitation or left exposed overnight. Provide cut-offs at end of each day's work to cover exposed ply sheets and insulation with two (2) plies of#15 organic roofing felt with joints and edges sealed with roofing cement and other jointly agreed upon tie-in detail. Remove cut-offs immediately before resuming work.

E. Substrate Joint Penetrations: Prevent bitumen from penetrating substrate joints, entering building, or damaging roofing system components.

F. Apply roofing materials as specified herein unless recommended otherwise by manufacturer's instructions. Keep roofing materials dry before and during application. Do not permit phased construction. Complete application of roofing plies, modified sheet and flashing in a continuous operation. Begin and apply only as much roofing in one day as can be completed that same day.

G. Cut-Offs: At end of each day's roofing installation, protect exposed edge of incomplete work, including ply sheets and insulation. Provide temporary covering of two 1 plies torch smooth roofing membrane with joints and edges sealed or other jointly agreed upon tie-in detail.

H. A minimum two-hour fire watch to remain daily after installation of last torch applied membrane for each day that torch-applied membranes are installed.

I. Keep an ABC rated fire extinguisher in a location per OSHA requirements where all workers are aware of its location and how to operate it properly.

J. Scope Overview:

   a. Install taper insulation as per plans and specifiications.

   b. Apply ½” Densdeckprime insulation coverboard.

   c. Torch apply SBS-modified torch base sheet, 120 mil – HPR Torch Base Sheet.

   d. Torch apply SBS-modified torch cap sheet, 135 mil. Cap sheet to be Title 24 compliant (CRRC certified) – Stressply IV UV Plus Mineral.

e. Torch apply SBS-modified flashing ply in all flashing areas extending the flashing base ply 6" onto the roof field. Torch apply SBS-modified flashing cap sheet in all flashing areas extending 9" onto the roof field.

f. Flashing Details:

1. Parapet Wall: Install new 22 gauge, kynar coping cap**.** Install wood nailer if necessary. Prior to installing the metal, wrap the flashing plies up and over the wall extending 2" down per manufacturer details. District to determine color of the metal.

2. Interior Wall: Terminate with a termination bar set in butyl tape and fastened every 6" o.c. Caulk above the termination bar. Install 22 gauge, galvanized counterflashing metal. Caulk above the existing metal.

3. Edge Metal: Install new, 22 gauge kynar edge metal. Set all edge metal in mastic and prime prior to flashing ply installation.

4. All flashings to be terminated with a termination bar set in butyl tape. Termination bar to be fastened every 6" o.c. with caulking above the termination bar.

5. All sheet metal to be installed with ANSI SPRI ES-1 compliant metal.

g. Install new lead flashings at all penetrations. Clamp and caulk all lead flashings. Umbrella cover required for the lead flashing. No pitch pockets. Solar penetrations to be lead flashed.

h. Place all conduits, pipes and any other utility lines on rubber blocks as needed.

i. Apply liquid flashing to all ladder support penetrations.

j. Walkpads not required.

## 3.03 MEMBRANE INSTALLATION

A. Base Ply Installation

1. Install one layer of SBS Torch Base Sheet to a properly prepared substrate. Shingle in proper direction to shed water on each area of roofing.

2. Using a roofing torch, heat the surface of the coiled portion until the burn-off backer melts away. At this point, the material is hot enough to lay into the substrate. Progressively unroll the sheet, while heating and press down with your foot to insure a proper bond.

3. After the major portion of the roll is bonded, re-roll the first six feet and bond it in a similar fashion.

4. Repeat this operation with subsequent rolls with side laps or four inches and end laps of eight inches.

5. Give each lap a finishing touch by passing the torch along the joint and spreading the melted bitumen evenly with a rounded trowel to insure a smooth, tight seal.

6. Extend underlayment two inches beyond top edges of cants at wall and projection bases.

7. Install base flashing ply to all perimeter and projections details.

B. Modified Membrane Installation

1. The modified membrane shall then by solidly adhered to the base layers.

2. Starting at the low point, unroll the StressPly IV UV Plus Mineral in the desired position.

3. Install subsequent rolls of modified membrane across the roof as above with a minimum of four (4) inch side laps and eight (8) inch end laps. Stagger the end laps. Apply the modified membrane in the same direction as the previous layers but stagger the laps so they do not coincide with the laps of the base layers.

4. Where a lap is to be made to the granular surface, vigorously brush loose granules from the surface to be mated and carefully apply Flashing Bond to the granular surface. And allow 5-10 minutes to flash. Join the two surfaces and using a small metal roller or other suitable roller, firmly press into place. Roll edges firmly to ensure positive adhesion.

5. Extend membrane two (2) inches beyond top edge of all cants as shown on the drawings.

C. Flashing Membrane Application

1. All curb, wall and parapet flashings shall be sealed on a daily basis. No condition should exist that will permit moisture entering behind, around or under the roof or flashing membrane.

2. Prepare all walls, penetrations and expansion joints to be flashed with asphalt primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.

3. All flashing plies will be adhered with a roofer's torch. The modified membrane will be used as the flashing and will be nailed off eight inches o.c. at all vertical surfaces.

4. The entire sheet of flashing membrane must be solidly adhered to the substrate.

5. Seal all vertical laps of flashing membrane with a three-course application of Flashing Bond and fiberglass mesh.

6. Counter flashing, cap flashings, expansion joints, and similar work to be coordinated with modified bitumen roofing work are specified in other sections.

7. Roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices to be coordinated with the roofing system work are in other sections. Pitch pockets are not allowed.

## 3.04 INSTALLATION EDGE TREATMENT AND ROOF PENETRATION FLASHING

A. Metal Edge:

1. Inspect the nailers to assure proper attachment and configuration.

2. Run one ply over the edge. Assure coverage of all wood nailers. Fasten plies with ring shank nails at 8 inches (203 mm) o.c.

3. Install continuous cleat and fasten at 6 inches (152 mm) o.c.

4. Install new metal edge hooked to continuous cleat and set in bed of roof cement. Fasten flange to wood nailers every 3 inches (76 mm) o.c. staggered.

5. Prime metal edge at a rate of 100 square feet per gallon and allow to dry. Do not prime for Green-Lock System lightly sand metal to improve bond.

6. Strip in flange with base flashing ply covering entire flange in bitumen with 6 inches (152 mm) on to the field of roof. Assure ply laps do not coincide with metal laps.

7. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Seal outside edge with rubberized cement.

B. Roof Edge With Gutter:

8. Inspect the nailer to assure proper attachment and configuration. Increase slope at metal edge by additional degree of slope in first board.

9. Run one ply over the edge. Assure coverage of all wood nailers. Fasten plies with ring shank nails at 8 inches (203 mm) o.c.

10. Install gutter and strapping.

11. Install continuous cleat and fasten at 6 inches (152 mm) o.c.

12. Install new metal edge hooked to continuous cleat and set in bed of roof cement. Fasten flange to wood nailer every 3 inches (76 mm) o.c. staggered.

13. Prime metal edge at a rate of 100 square feet per gallon and allow to dry. Do not prime for Green-Lock System lightly sand metal to improve bond.

14. Strip in flange with base flashing ply covering entire flange in bitumen with 6 inches (152 mm) onto the field of the roof. Assure ply laps do not coincide with metal laps.

15. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof.

C. Scupper Through Wall:

16. Inspect the nailer to assure proper attachment and configuration.

17. Run one ply over nailer, into scupper hole and up flashing as in typical wall flashing detail. Assure coverage of all wood nailers.

18. Install a scupper box in a 1/4 inch (6 mm) bed of mastic. Assure all box seams are soldered and have a minimum 4 inch (101 mm) flange. Make sure all corners are closed and soldered. Prime scupper at a rate of 100 square feet per gallon and allow to dry.

19. Fasten flange of scupper box every 3 inches (76 mm) o.c. staggered.

20. Strip in flange of scupper box with base flashing ply covering entire area with 6 inch (152 mm) overlap on to the field of the roof and wall flashing.

21. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all seams.

D. Reglet Mounted Counterflashing:

1. Minimum flashing height is 8 inches (203 mm) above finished roof height. Maximum flashing height is 24 inches. Prime vertical wall at a rate of 100 square feet per gallon and allow to dry.
2. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).
3. Install base flashing ply covering wall set in bitumen with 6 inches (152 mm) on to field of the roof.
4. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.
5. Apply butyl tape to wall behind flashing. Secure termination bar through flashing, butyl tape and into wall. Alternatively use caulk to replace the butyl tape.
6. Cut reglet in masonry one joint above flashing.
7. Secure reglet counterflashing with expansion fasteners and caulk reglet opening.

E. Expansion Joint:

1. Minimum curb height is 8 inches (203 mm) above finished roof height. Chamfer top of curb. Prime vertical curb at a rate of 100 square feet per gallon and allow to dry.
2. Mechanically attach wood cant to expansion joint nailers. Run all field plies over cant a minimum of 2 inches (50 mm).
3. Install compressible insulation in neoprene cradle.
4. Install base flashing ply covering curb set in bitumen with 6 inches (152 mm) on to field of the roof.
5. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Attach top of membrane to top of curb and nail at 8 inches (203 mm) o.c. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.
6. Install pre-manufactured expansion joint cover. Fasten sides at 12 inches (609 mm) o.c. with fasteners and neoprene washers. Furnish all joint cover laps with butyl tape between metal covers.

F. Equipment Support:

1. Minimum curb height is 8 inches (203 mm) above finished roof height. Prime vertical at a rate of 100 square feet per gallon and allow to dry.
2. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).
3. Install base flashing ply covering curb set in bitumen with 6 inches (152 mm) on to field of the roof.
4. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Attach top of membrane to top of curb

and nail at 8 inches (203 mm) o.c. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.

5. Install pre-manufactured cover. Fasten sides at 24 inches (609 mm) o.c. with fasteners and neoprene washers. Furnish all joint cover laps with butyl tape between metal covers.

6. Set equipment on neoprene pad and fasten as required by equipment manufacturer.

G. Curb Detail/Air Handling Station:

1. Minimum curb height is 8 inches (203 mm) above finished roof height. Prime vertical at a rate of 100 square feet per gallon and allow to dry.

2. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).

3. Install base flashing ply covering curb set in bitumen with 6 inches (152 mm) on to field of the roof.

4. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.

5. Install pre-manufactured counterflashing with fasteners and neoprene washers or per manufacturer's recommendations.

6. Set equipment on neoprene pad and fasten as required by equipment manufacturer.

H. Passive Vent/Air Intake:

1. Minimum curb height is 8 inches (203 mm) above finished roof height. Prime vertical at a rate of 100 square feet per gallon and allow to dry.

2. Set cant in bitumen. Run all plies over cant a minimum of 2 inches (50 mm).

3. Install base flashing ply covering curb with 6 inches (152mm) on to the field of the roof.

4. Install a second ply of modified flashing ply installed over the base flashing ply, 9 inches (228 mm) on to field of the roof. Attach top of membrane to top of wood curb and nail at 8 inches (203 mm) o.c. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.

5. Install passive vent/air intake over the wood nailers and flashing to act as counterflashing. Fasten per manufacturer's recommendations.

I. Roof Drain:

1. Plug drain to prevent debris from entering plumbing.

2. Taper insulation to drain minimum of 24 inches (609 mm) from center of drain.

3. Run roof system plies over drain. Cut out plies inside drain bowl.

4. Set lead/copper flashing (30 inch square minimum) in 1/4 inch bed of mastic. Run lead/copper into drain a minimum of 2 inches (50 mm). Prime lead/copper at a rate of 100 square feet per gallon and allow to dry.

5. Install base flashing ply (40 inch square minimum) in bitumen.

6. Install modified membrane (48 inch square minimum) in bitumen.
7. Install clamping ring and assure that all plies are under the clamping ring.
8. Remove drain plug and install strainer.

J. Plumbing Stack:

1. Minimum stack height is 12 inches (609 mm).
2. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric sealant.
3. Prime flange of new sleeve. Install properly sized sleeves set in 1/4 inch (6 mm) bed of roof cement.
4. Install base flashing ply in bitumen.
5. Install membrane in bitumen.
6. Caulk the intersection of the membrane with elastomeric sealant.
7. Turn sleeve a minimum of 1 inch (25 mm) down inside of stack.

K. Heat Stack:

1. Minimum stack height is 12 inches (609 mm).
2. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric sealant.
3. Prime flange of new sleeve. Install properly sized sleeves set in 1/4 inch (6 mm) bed of roof cement.
4. Install base flashing ply in bitumen.
5. Install modified membrane in bitumen.
6. Caulk the intersection of the membrane with elastomeric sealant.
7. Install new collar over cape. Weld collar or install stainless steel draw brand.

## 3.05 APPLICATION OF SURFACING

A. Prior to installation of surface, obtain approval from manufacturer as to work completed Roof besides mastic can be coated immediately upon approval of punch list items.

B. Reflective Coating: No coatings on this project. Installed sheet must meet title 24 requirements.

C. Sawtooth Valleys: Apply cold process polymer modified coal tar restoration top coating – Black Knight Cold (or equal) – at a rate of 5 gal per sq. Embed 400 lbs per sq of Title 24 compliant, white gravel into the coating. Surface coating to extend the width of the valley.

D.

## 3.06 CLEANING

A. Remove drippage of bitumen from all walls, windows, floors, ladders and finished surfaces.

B. In areas where finished surfaces are soiled by asphalt or any other sources of soiling caused by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their instructions.

3.07 FINAL INSPECTION

A. At completion of roofing installation and associated work, meet with Installer, installer of associated work, OUSD, roofing system manufacturer's representative, and other representatives directly concerned with performance of roofing system.

B. Inspect roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each parting attending.

C. OUSD reserves the right to request a thermographic scan of the roof during final inspection to determine if any damp or wet materials have been installed. The thermographic scan shall be provided by the Contractor at no additional cost to OUSD.

D. If core cuts verify the presence of damp or wet materials, the Contractor shall be required to replace the damaged areas at his own expense.

E. Repair or replace (as required) deteriorated or defective work found at time above inspection to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

F. The Contractor is to notify OUSD upon completion of corrections.

G. Following the final inspection, acceptance will be made in writing by the material manufacturer.

END OF SECTION 07 52 16

## SECTION 07 62 00 - ROOF RELATED SHEET METAL

## PART I - 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.

### 1.1 SECTION INCLUDES

A. It is the intent of this Section that the Work shall:
   1. Conform to all applicable building code requirements and of authorities having jurisdiction;
   2. Include all shop and field formed sheet metal work shown on drawings, specified or required, including, but not limited to:
      a. Roof penetration sleeves and hood and umbrella counterflashing
      b. Metal counterflashing
      c. Expansion joint
      d. Roof drains
      e. Scuppers
      f. Metal perimeter edge
      g. Gutters, Downspouts, Splash Blocks and Splash Pans
      h. One-way roof moisture relief vents
      i. Metal gravity vents
      j. Metal heat exhaust vents
      k. Sanitary vent pipes
      l. Pipe box
      m. Copings, trim and miscellaneous sheet metal accessories.
   3. be part of the Work of Section 07 52 50, Modified Bitumen Membrane Roofing System; and be performed by a single source contractor.

B. Related Sections:
   1. Section 07 52 19; Modified Bitumen Membrane Roofing System.
   2. Section 07 72 00; Roof Accessories.
   3. All Sections of Work relating to or affecting the roofing system, including mechanical, plumbing and electrical items.

### 1.2 REFERENCES

A. ASTM International (ASTM)
   1. A525, Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
   2. A526, Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality
   3. A527, Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality
   4. A167, Standard Specification for Galvanized and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
   5. B32, Standard Specification for Solder Metal
   6. C1107, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

B. FM Global (FM)
   1. Loss Prevention Data Sheets: I-49, Perimeter Flashing

C. National Association of Architectural Metal Manufacturers (NAAMM)

D. National Roofing Contractors Association (NRCA)
1. Roofing and Waterproofing Manual – Latest Edition

E. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
1. Architectural Sheet Metal Manual – Latest Edition

F. ANSI / SPRI ES-1: Fabricate and install sheet metal edge flashings and copings to comply with requirements of ANSI / SPRI ES-1 for 115 MPH wind speed zone and wind resistance loads.

## 1.3 SUBMITTALS

A. Product Data:
1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
2. Manufacturer's installation instructions.

B. Shop Drawings: Indicating sizes, configurations, details of attachment to related and adjacent work, materials, and finishes.

C. Samples:
1. Full range of finish colors for Architect's selection.
2. 12 inch long sample of each specified item with approved finish.
3. Provide full size mockup of all shop built assemblies.

## 1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Fabricator and installer of roof-related flashing and accessories shall be the same as the membrane roof installer.

B. Comply with governing codes and regulations of authorities having jurisdiction.

## 1.5 INSTALLATION CONFERENCE

A. Installation conference to be conducted on site.

## 1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver, handle and store materials in accordance with manufacturer's instructions.

B. Handle and store materials and equipment in such a manner as to avoid damage.

C. No storage of materials shall be permitted on roof areas other than those materials that are to be installed the same day. Any exception must be in written form. Do not place materials or equipment in such a manner as to overload structure.

## 1.7 WARRANTIES

A. Manufacturer's Product Warranty:
1. Manufacturer's standard 20 year Kynar 500 or Hylar 5000 Finish warranty signed by the manufacturer, with guarantee covering any failure of the fluoropolymer finish during the warranty period.
2. Failure is defined to include, but not be limited to:

a. Deterioration of finish, such as fading, discoloring, peeling, cracking, corroding, etc.

3. Correction may include repair or replacement of failed product.

B. Roofing Contractor's Warranty:

1. Contractor shall warrant the sheet metal work and related work to be free from defects in workmanship and materials, and that the metal flashings will be and remain watertight, for a period of five (5) years from date of Substantial Completion.
2. Defects shall include, but not be limited to:
   a. Leaking water or bitumen within building or construction.
   b. Becoming loose from substrate.
   c. Loose or missing parts.
   d. Finish failure as defined above.

## PART 2 PRODUCTS

### 2.1 APPROVED MANUFACTURERS

A. Manufacturers named within specification are approved for use on the Project providing:

1. their products meet or exceed the specifications;
2. company has a minimum of five (5) years experience manufacturing products of the type specified;
3. products have been tested in conjunction with roofing membrane system as an assembly and as such has obtained the same approval and rating as the roofing membrane system; and
4. products are approved for use by the roofing membrane manufacturer.

B. Substitutions shall be in accordance with Division 1 requirements regarding substitutions.

### 2.2 SHEET METAL MATERIALS

A. General Requirements: Roofing sheet metal system shall have been tested in conjunction with roofing membrane system as an assembly and have the same approval and rating as the roofing membrane system.

B. Prefinished Galvanized Sheet Steel:

1. Commercial quality ASTM A527 G-90 hot-dip galvanized coating designation.
2. Thickness: Except as otherwise indicated, minimum 24 gauge. SMACNA recommendations shall govern.
3. Finish: Kynar 500 or Hylar 5000 in color as selected by Architect from manufacturer's full range of colors.

C. Sheet Lead:

1. Comply with FS QQ-L-201, Grade B
   a. Four (4) pound minimum for use at roof drains and soil stacks.

D. Galvanized Steel: ASTM A527 with G-90 hot-dip galvanized coating designation. Minimum thickness 24 gauge, except as otherwise noted.

E. Stainless Steel: ASTM A167, Type 302/304 Soft Temper, No. 2D finish. Minimum thickness 24 gauge, except as otherwise noted.

## 2.3 FASTENERS

A. Same metal as flashing/sheet metal or other non-corrosive metal or as noted below.

B. Exposed fasteners shall be self-sealing and gasketed for weathertight installation. (ZAC type)

C. Match finish of exposed heads with material being fastened.

D. Mechanical Fasteners:
   1. Nails: Ring shank, minimum 1-1/2 inches in length with 1/2 inch diameter head.
   2. Washers: Steel washers with bonded rubber sealing gasket.
   3. Screws: Self-tapping/Self-piercing sheet metal type of galvanized steel or compatible with material being fastened, with integral EPDM washers.
   4. Rivets: Stainless steel and cadmium plated material, closed end type of sizes recommended by sheet metal manufacturer to suit application.

E. Clips:
   1. Continuous Cleat (coping/fascia): Minimum 22 gauge, G-90 galvanized finish or galvanized steel. Match material of coping/fascia and provide one (1) gauge heavier.

## 2.4 RELATED MATERIALS

A. Solder: ASTM B32, alloy grade 58, 50 percent tin, 50 percent lead.

B. Flux:
   1. Phosphoric acid type, manufacturer's standard.
      a. For Use with Steel or Copper: Rosin flux
      b. For Use with Galvanized Steel: Acid-chloride type flux, except use rosin flux over tinned surfaces.

C. High-Temperature Sheet 40 mil thick SBS modified bituminous product of self-adhering type with polyethylene-film surface conforming to "Lastobond Shield HT" manufactured by Soprema, Inc., or approved equal.

D. Adhesives: Type recommended by flashing sheet manufacturer seaming and adhesive application of flashing sheet to ensure adhesion and watertightness.

E. Metal Accessories: Sheet metal clips, straps, anchoring devices, clamps and similar accessories required for the complete installation of work, matching or compatible with material being installed, non-corrosive, size and gauge recommended by installer to suit application and performance.

F. Sealant:
   1. Type A:
      a. Type: One-part, non-sag, moisture-curing polyurethane sealant.
      b. Approved Products/Manufacturers:
         1. "Chem-Calk 900" manufactured by Bostik Construction Products Division,
         2. "Vulkem 921" manufactured by Mameco International, Inc.,
         3. "Dynatrol I" manufactured by Pecora Corporation,
         4. "NP 1" manufactured by Sonneborn Building Products, or
         5. Approved equal.
   2. Type B:

a. Type: One-part, neutral-curing, medium-modulus silicone sealant for sealing metal to metal surfaces, i.e. metal edge, cover plates, etc.
b. Approved Products/Manufacturers:
1. “Chem-Calk 1200” manufactured by Bostik Construction Products Division,
2. “795 Silicone Building Sealant” manufactured by Dow Corning Corporation,
3. “895 Silicone” manufactured by Pecora Corporation,
4. “Omniseal” manufactured by Sonneborn Building Products,
5. “Spectrem 2” manufactured by Tremco Incorporated, or
6. Approved equal.

G. Liquid Applied Penetration Flashing System:
1. Polyurethane bituminous PMMA resin with polyester fleece reinforcement specifically formulated for liquid applied flashing or roof penetrations to be utilized at following locations:
a. Flashing drains, penetrations, protrusions, electrical penetrations, low curb details, I-beams and other similar or unconventional conditions.
b. Approved Product/Manufacturer:
1. Soprema Product: Alsan Flashing; Polyfleece
2. Siplast Product: ParaPro Flashing Resin; Pro Fleece
3. Firestone Product: UltraFlash Liquid Flashing; UltraFlash Fabric

H. Termination Bar:
1. Material: Extruded aluminum bar with flat profile.
2. Size: 1/8 inch thick by one (1) inch wide with factory punched 1/4 inch x 3/8 inch oval holes spaced six (6) inches on center.
3. Approved Product/Manufacturer: “TB 125” manufactured by TruFast Corp., or approved equal.

I. Pipe Hangers and Supports: Refer to Section 07 72 00, Roof Accessories.

J. Splash Blocks: Concrete type, of size and profiles indicated; minimum 3,000 psi compressive strength at 28 days, with minimum five (5) percent air entrainment. Use at locations where roof drainage dumps on ground.

K. Splash Pans: 22 gauge galvanized steel, of size and profiles indicated. Use at locations where roof drainage discharges over adjoining, lower roof level(s).

## 2.5 FABRICATION

A. Except as otherwise indicated, fabricate work in accordance with SMACNA Architectural Sheet Metal Manual and other recognized industry practices and reviewed shop drawings. Form all flashings, receivers and counterflashings in accordance with standards set forth in the NRCA roofing manual *and* SMACNA.

B. Comply with manufacturer's installation instructions and recommendations.

C. Unless noted otherwise, fabricate perimeter edge/fascia, scuppers, gutters, downspouts, copings, and trim from pre-finished galvanized sheet.

D. Shop fabricate work to greatest extent possible. Fabricate inside and outside corners for metal edges, counterflashing, and coping caps of equal length – minimum 2 foot lengths

E. Fabricate items to size and dimensions as indicated on the drawings. Limit single-piece lengths to ten (10) feet.

F. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work sufficient to permanently prevent leakage, damage or deterioration of the work.

G. Integrate flashing in a manner consistent with detailing. Form work to fit substrates.

H. Make angle bends and folds for interlocking metal with full regard for expansion and contraction to avoid buckling or fullness in metal after installation.

I. Fabricate items with straight lines, sharp angles, smooth curves, and true levels. Avoid tool marks, buckling, and oil canning.

J. Fold back edges on concealed side of exposed edge to form hem.

K. Unless noted otherwise, lap joints minimum one (1) inch. Rivet and solder joints on parts that are to be permanently and rigidly assembled.

L. Seams:
1. Wherever possible, fabricate non-moving seams in sheet metal with flat-lock seams and end joints.
2. Pre-finished Galvanized Steel: Seal pre-finished metal seams with rivets and silicone sealant.
3. Metal Other than Aluminum: Tin edges to be seamed, form seams, and solder.

M. On Kynar 500 or Hylar 5000 pre-finished metal, surface sand metal flanges prior to applying any primers. Prime all metal in contact with bituminous material.

N. Backpaint all concealed metal surfaces with bituminous paint where expected to be in contact with cementitious materials or dissimilar metals.

O. Expansion Provisions: Where lapped or bayonet type expansion provisions in work cannot be used or would not be sufficiently waterproof or weatherproof, form expansion joints of intermeshing hooked flanges, not less than one (1) inch deep filled with mastic sealant concealed within joints.

## 2.6 FABRICATED ITEMS

A. Metal Flashings: (Minimum ten (10') foot lengths)
1. Through wall Receiver Tray: Minimum 24 gauge stainless steel, through wall receivers shall not extend past the face of the exterior veneer more than ¾".
2. Counterflashing: Minimum 24 gauge pre-finished galvanized metal.

B. Wind Clips: Minimum 24 gauge to match material of counterflashing, one (1) inch wide by length to engage counterflashing a minimum of 1/2 inch.

C. Metal Edge:
1. Minimum 24 gauge pre-finished galvanized metal formed in maximum ten (10) foot lengths, with six (6) inch wide cover plates of same profile, four (4) inch flange, maximum seven (7) inch fascia, including a 3/4 inch gravel stop. For fascias over (7) inches a two (2) piece fascia with separate cleat will be required.
2. Provide expansion slip joints at maximum 20 feet on center.

3. Shop fabricate all interior and exterior corners. Fabricate exterior corners with 18 inch minimum to four (4) foot maximum legs. Lap, rivet, and seal prior to delivery to jobsite.
4. Fabricate to sizes and dimensions as indicated on drawings with a minimum one (1) inch coverage past top of wall. Refer to SMACNA Fig. 2-5A.
5. Provide mock-up for Architect's approval prior to fabrication.

D. Continuous Cleats: Continuous strips, same material and profile, minimum one gauge heavier of item which cleats attach.

E. Vent Hoods, Sleeves, Penetration Flashings, and Accessories: Minimum 24 gauge stainless steel, or as shown or directed otherwise.

F. Angle Termination Bar: One (1) inch x one (1) inch 24 gauge galvanized steel.

G. Roof Drain Flashing: Four (4) pound lead, minimum 36 inches by 36 inches.

H. Coping:
1. 24 gauge pre-finished galvanized metal, with six (6) inch wide cover plates of same profile.
2. Fabricate as outlined in SMACNA; Refer to Figure 3-4 A.
3. Provide tapered substrate to slope to one (1) side, and cover with waterproof membrane.
4. Install with continuous cleat one (1) side and fasten other side.

I. Gutters, Downspouts and Collector Heads:
1. Gutters and Downspouts:
   a. 24 gauge pre-finished galvanized metal formed in maximum ten (10) foot lengths, with six (6) inch wide cover plates.
   b. Minimum five (5) inch x six (6) inch box gutter (verify size meets rainfall data per SMACNA).
2. Gutter/Downspout Straps:
   a. Minimum 24 gauge pre-finished (match color of gutter) galvanized metal. Hem both sides.
3. Gutter Supports:
   a. 24 gauge pre-finished galvanized steel. Hemmed around 1/8 inch galvanized bent steel bracket.
4. Gutter Screen:
   a. Galvanized steel ¼" diamond wire screen enclosed in a pre-finished steel frame.
5. Collector Head:
   a. 24 gauge pre-finished galvanized metal.
   b. As outlined in SMACNA;
   c. Refer to Figure 1-25F and Figure 1-28 with alternate Section A-A.
6. Base Metal:
   a. Steel conforming to:
      1. ASTM A924/A792 (Formerly ASTM A792) minimum yield 40,000 psi
      2. [For primers thicker than 0. 5 mil] Steel conforming to ASTM A65 3 (formerly ASTM A446), G-90 Galvanized, minimum yield 43,500 psi
      3. 24 gauge.

J. Pipe Box Cover: 24 ga. stainless steel.

K. Heat Exhaust Curbs and Hoods: 22 gauge stainless steel.

L. Expansion Joint Cover: Minimum 24 ga. galvanized metal (Provide pre-finished metal at perimeter edge end termination.)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Verify substrates are smooth and clean to extent required to perform sheet metal work.

B. Verify roof openings, curbs, pipes, sleeves, ducts or vents through roof are solidly set in place.

C. Verify that reglets, nailers, cants, and blocking to receive sheet metal are in place and free of concrete and soil.

D. Do not start work until conditions are satisfactory.

### 3.2 PREPARATION

A. Field measure site conditions prior to fabrication work.

B. Install starter and edge strips and cleats before starting installation.

### 3.3 INSTALLATION

A. Install sheet metal with lines, arises, and angles sharp and true, and plane surfaces free from objectionable wave, warp, or buckle. Exposed edges of sheet metal shall be folded back to form 1/4 inch hem on concealed side from view. Finished work shall be free from water retention and leakage under all weather conditions. Pre-fabricated corners or transitions are required at changes in direction, elevation, or plane and at intersections. Locate field joints not less than 12 inches, nor more than three (3) feet from actual corner. Laps shall be one (1) inch, riveted and soldered at following locations:
1. Pre-fabricated corners;
2. transitions;
3. changes in direction, elevation, and plane; and
4. at intersections.

B. Anchor units of work securely in place to prevent damage or distortion from wind or buckling. Provide for thermal expansion of metal units; conceal fasteners wherever possible; and set units true to line and level as indicated. Install work with laps, joints, and seams which are permanently watertight and weatherproof.

C. Install fabricated sheet metal items in accordance with manufacturer's installation instructions and recommendations and with SMACNA Architectural Sheet Metal Manual.

D. Separations: Provide for separation of metal from dissimilar metal or corrosive substrates by coating concealed surfaces with zinc chromate, bituminous coating, or other permanent separation at locations of contact as recommended by manufacturer or fabricator. Do not use materials which are incompatible with roofing system.

E. Continuous Cleat: At exposed edges of perimeter edge, fascias, cap flashings, and where required, attach continuous cleat at six (6) inches on center with appropriate fasteners.

F. Gravel Guard/Fascia:

1. Install with expansion joints 10 feet o.c., 1/2 inch expansion leeway, with cover plate.
2. Set in asphalt mastic and fasten into nailer at 3 inches o.c. staggered.
3. Buff sand Kynar surface of flange and prime.
4. Strip in flange with specified stripping plies set in hot bitumen extending 3 inches from outer edge of flange to at least 3 inches inward towards gravel stop. Provide finish stripping ply of modified bitumen base ply in hot bitumen extending 6 inches from the outer edge of the flange and butt base of gravel stop.

G. Counterflashing:
1. Do not use surface mount counterflashing
2. Set in through wall with receiver and spring lock counterflashing, as detailed in drawings and to NRCA roofing manual, SMACNA standards.
3. Coordinate installation of through-wall flashing with the veneer contractor.
4. Seal through-wall in conjunction with substrate wall waterproofing.
5. Install wind clips 30 inches o.c. at all counterflashing over five (5) feet in length.

H. Liquid Applied Penetration Flashing System: (Sanitary Vent Stacks)
1. Precut fleece for wrapping pipe, ensure the fleece extends 4” up the pipe and the fingers extend a minimum of 2” onto the field. The fingers of the fleece should be approximately 1-2” wide. Ensure when wrapping the pipe, the fleece overlaps 1”.
2. Precut fleece for field, ensure the fleece extends 8” from the pipe in all directions. Using two pieces of fleece with overlap of 2” and cut out an opening for the pipe allowing a “snug” fit.
3. Dry fit all of the fleece for proper fit. Tape off 1” past the fleece in the field and on the pipe for clean application. Label fleece pieces (1,2,3) and mark on tape to ensure proper order of placement.
4. Buff sand penetration to create a rough surface.
5. Stir liquid flashing to ensure no separation.
6. Apply liquid flashing to the penetration at a rate of 2 gallons per square, ensuring there is no drips, dry spots and that the coverage is uniform.
7. Apply fleece to wet liquid flashing using the brush to ensure fingers spread correctly and lay flat. Apply liquid flashing in fleece 1” overlap to ensure fleece remains in place then apply liquid flashing to fleece on pipe and onto fingers. Apply in the direction of the fleece wrap to prevent voids, fish mouths, and/or creases in the fleece.
8. Apply liquid flashing to 1/2 of the field area at a rate of 2 gallons per square, look for similar coverage as the first application to the pipe and no dry spots.
9. Apply fleece into wet liquid flashing. Do not apply full coating on top just ensure it is set in place with light pressure.
10. Apply liquid flashing to the other 1/2 of the field area and in the area that will be overlapped by the second piece of field fleece.
11. Apply fleece into wet liquid flashing and coat the full field area with liquid flashing at a rate of 2 gallons per square. Ensure that the fleece is completely saturated and there are no voids or dry areas.
12. Remove tape around penetration and field and let dry 24 to 48 hours (curing time may vary with temperature and humidity)
13. Apply second coat of liquid flashing to pipe and field after first coat cures approximately 1-1/2” past the previous application at a rate of 2 gallons per square.
14. Broadcast granules into liquid flashing until refusal. Wait for coat to dry and then brush off remaining granules.

I. Roof Drains:
1. After membrane installation, prime bottom of lead flashing sheet and set in uniform bed of plastic roof cement at specified locations.

2. Extend lead flashing into drain bowl or pipe a minimum of two (2) inches and over top of piping/bowl connection, if possible. Apply a continuous bead of specified Type A sealant, at intersection of pipe and drain bowl.
3. If drain bowl and pipe connection is contaminated with bituminous material, strip-in area with three (3) coursing of plastic roof cement and fabric.
4. Prime top of lead flashing sheet to receive strip-in membrane.

J. Gutters / Downspouts:
1. Install gutters as detailed.
2. Install downspouts plumb and level, attached to columns or wall with straps located at top and bottom of downspout and maximum ten (10) feet on center.
3. Install splash pad or block under discharge port of downspouts. Install splash pan over a protection (walkway) pad for downspouts located at roof level.
4. End Caps, Downspout Outlets, Gutter and Downspout Straps, Support Brackets and joint fasteners to be manufactured to suit profile and dimension of gutter and downspout.
5. Install all anchoring devices as outlined in SMACNA.
6. Expansion Joints: Lap or Butt type per SMACNA, locate every 50 linear feet.

K. Expansion Joint:
1. Construct wood curbs as shown on drawings and as outlined in the NRCA and SMACNA Manuals.
2. Install underlayment, form envelope, and secure underlayment to curb. Fill envelope with compressible insulation.
3. Securely fasten expansion joint cover to curb with grommetted fasteners spaced six (6) inches on center.
4. Taper expansion joint down at the metal edge.

L. Coping:
1. Install wood nailers as shown on drawings.
2. Install metal cleats with appropriate fasteners spaced six (6) inches on center.
3. Install underlayment over the wood substrate. Lap ends minimum of six (6) inches and secure membrane in place. Seal laps with appropriate adhesive.
4. Install metal coping allowing 1/2 inch spaces between segments. Lock coping onto cleat and install appropriate fasteners through the interior fascia spaced 24 inches on center in enlarged holes.
5. Install cover plate centered over coping joint in continuous beads of specified Type B sealant, placed approximately one (1) inch from cover edges. Refer to SMACNA for alternate joints as required by length.
6. Install appropriate fastener through neoprene washer and cover plate between coping segments.
7. Accommodate building wall expansion joints by terminating coping joints and cleats either side of expansion joint. Do not run coping or cleats continuous across joints. Install coping cover plate to span across joint and lap coping on each side of joint a minimum of four (4) inches. Fasten cover plate on one (1) side of joint only. (Provide wall flashing membrane up and over parapet wall in accordance with manufacturer's detail.)

## 3.4 CLEANING AND PROTECTION

A. Remove flux and residual acid immediately by neutralizing with baking soda and washing with clean water. Leave work clean of stains.

B. Remove scraps and debris and leave work area clean.

C. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes. Paint areas where finish is damaged on pre-finished metal by painting with a compatible paint in color to match undamaged finish.

D. Prime soldered area of phosphatized metal after cleaning to prevent rusting.

E. Paint metal flashings that have been soiled with bitumen with aluminized paint.

F. Clean other work damaged or soiled by Work of this Section.

G. Protect finished work from damage.

**END OF SECTION 07 62 00**

## SECTION 01 10 00 SUMMARY

## PART 1 GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SECTION INCLUDES: REQUIREMENTS SUMMARY

A. including but not limited to:
1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work by Owner.
5. Work under separate contracts.
6. Future Work.
7. Purchase contracts.
8. Owner furnished products.
9. Owner furnished, Contractor installed products.
10. Access to site.
11. Coordination with occupants.
12. Work restrictions.
13. Specification and drawing conventions.
14. Miscellaneous provisions.

### 1.3 PROJECT INFORMATION

A. Project Identification:
1. Project Location: **El Camino HS - Truax Theater**
400 Rancho Del Oro Drive
Oceanside, CA 92057

B. Owner: **Oceanside Unified School District**
2111 Mission Avenue
Oceanside, CA 92058

C. Engineer of Record: **LEAF Engineers**
11455 El Camino Real
Suite 480
San Diego, CA 92130

D. Consultants: Additional design professionals have been retained who have prepared designated portions of the Contract Documents. Refer to “stamp” page this project manual.

### 1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following: The project scope includes the replacement of existing Roofing, HVAC system, and Ladders including miscellaneous casework replacement, ceiling replacement, patching and painting.
1. Buildings effected on the site are:
a. H – Truax Theater Building

B. Type of Contract: Project will be constructed under a Single Prime Contractor.

## 1.5 WORK BY OWNER AND UNDER SEPARATE CONTRACTS

A. The Owner reserves the right to let separate contract for work outside of the scope of this Contract. Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

B. Owner Furnished Products (OFCI): The Owner will furnish products indicated. The work includes receiving, unloading, handling, storing, protecting, and installing Owner furnished products and making building services connections when applicable.
   1. Owner Furnished Products: Coordinate with Owner (Classroom equipment by Owner)

## 1.6 ACCESS TO SITE

A. Use of Site: Limit use of Project site to Work in areas and areas within the Contract limits indicated. Do not disturb portions of site beyond areas in which the Work is indicated.
   1. Limits: The drawings indicate the limits of the construction operations.
   2. Driveways, Walkways, and Entrances: Keep driveways. parking areas, student drop off and pick up points, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, the students, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
      b. Schedule deliveries to minimize use of driveways and entrances by construction operations.
      c. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

B. Condition of Existing Building: Maintain portions of existing building affected by construction operations in weathertight condition throughout construction period. Repair damage caused by construction operations.

## 1.7 COORDINATION WITH OCCUPANTS

A. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
   1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
   2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
   3. Before limited Owner occupancy, ensure mechanical and electrical systems are fully operational, and required tests and inspections and start up procedures are successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
   4. Upon occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

## 1.8 WORK RESTRICTIONS

A. Work Restrictions: Comply with restrictions on construction operations. Comply with limitations on use of public streets and with other requirements of authorities having

jurisdiction.

B. On Site Work Hours: Limit Work in the existing building to normal working hours, Monday through Friday, unless otherwise indicated. Coordinate with Owner when it is necessary to extend working hours or Work on weekends.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and after providing temporary utility services according to requirements indicated:
1. Notify Owner not less than two weeks in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
1. Notify Owner not less than two weeks in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.

E. Controlled Substances, Firearms, and Explosive Devices: Use of tobacco products, controlled substances, firearms, and explosive devices on the site is not permitted.

F. Employee Identification: Provide identification tags for Contractor personnel working on site. Require personnel to use identification tags at all times.

G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on site.
1. Maintain list of approved screened personnel with Owner's representative.

### 1.9 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 1 General Requirements: Requirements of Sections in Division 1 apply to the Work of each specification section.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations.

## PART 2 PRODUCTS

Not Used

## PART 3 EXECUTION

### 3.1 CONSTRUCTION SCHEDULE

A. The Owner has a critical need for the work to begin upon Notice to Proceed and shall be Substantially Complete by August 20, 2022**. There will be No Extensions of Time due to weather.**

**END OF SECTION 01 10 00**

# SECTION 01 73 29 CUTTING AND PATCHING

## PART 1 GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes: Procedural requirements for cutting and patching.

### 1.3 DEFINITIONS

A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair Work required to restore surfaces to original conditions after installation of other Work.

### 1.4 SUBMITTALS

A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
   1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
   2. Changes to In Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
   3. Products: List products used for patching and firms or entities that will perform patching Work.
   4. Dates: Indicate when cutting and patching will be performed.
   5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
      a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

### 1.5 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

B. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.

C. Operational Elements: Do not cut and patch operating elements and related components that results in reducing the capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
   1. Primary operational systems and equipment.

2. Fire separation assemblies.
3. Air or smoke barriers.
4. Fire suppression systems.
5. Mechanical systems piping and ducts.
6. Control systems.
7. Communication systems.
8. Fire-detection and -alarm systems.
9. Conveying systems.
10. Electrical wiring systems.
11. Operating systems of special construction.

D. Miscellaneous Elements: Do not cut and patch the following elements or related components that change the load bearing capacity, resulting in a reduction of capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Exterior curtain wall construction.
4. Equipment supports.
5. Piping, ductwork, vessels, and equipment.
6. Noise and vibration control elements and systems.
7. Sprayed fire resistive material.

E. Visual Requirements: Do not cut and patch construction resulting in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
1. If possible, retain original Installer or fabricator to cut and patch exposed Work. If possible, engage original Installer or fabricator. If original installer is not available, engage recognized, experienced, and specialized firm for the Work.
   a. Processed concrete finishes.
   b. Ornamental metal.
   c. Matched veneer woodwork.
   d. Preformed metal panels.
   e. Roofing.
   f. Firestopping.
   g. Window system.
   h. Fluid applied flooring.
   i. Wall covering.
   j. HVAC enclosures, cabinets, or covers.

F. Cutting and Patching Conference: Before proceeding, meet at site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

## 1.6 WARRANTY

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

## PART 2 PRODUCTS

### 2.1 MATERIALS

A. Comply with specified requirements.

B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

## PART 3 EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Services: Where removal, relocation, or abandonment is necessary, bypass existing services before cutting to avoid interruption of services to occupied areas.

### 3.3 CUTTING AND PATCHING

A. Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at earliest feasible time, and complete without delay.
   1. Cut existing construction to provide for installation of components or performance of construction, and subsequently patch as necessary to restore surfaces to an original condition.
   2. Cut in place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Temporary Support: Provide temporary support of Work to be cut.

C. Protection: Protect in place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to

requirements in Section 01 10 00; Summary of work and what is shown on drawings.

E. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   1. Use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. Finished Surfaces: Cut or drill from exposed or finished side into concealed surfaces.
   3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. Excavating and Backfilling: Comply with requirements in applicable earthwork specifications by cutting and patching operations.
   5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
   6. Proceed with patching after construction operations requiring cutting are complete.

F. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
   1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
   2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction to eliminate evidence of patching and refinishing.
      a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
      b. Restore damaged pipe covering to its original condition.

   3. Floors and Walls: Where walls or partitions are removed, extend one finished area into another, patch and repair surfaces in new space. Provide even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.
   4. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
   5. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
   6. Exterior Building Enclosure: Patch components and restore enclosure to a weathertight condition.

**END OF SECTION 01 73 29**

# SECTION 02 41 13 SELECTIVE SITE DEMOLITION

## PART 1 GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:
   1. Furnishing all labor, materials, and equipment necessary for demolition, dismantling, cutting, and alterations as indicated, specified, and required for completion of the Contract, as applicable. Includes items such as the following:
      a. Protecting existing work to remain.
      b. Cleaning soiled materials that are to remain.
      c. Disconnecting and capping utilities.
      d. Removing debris and equipment.
      e. Removal of items indicated on Drawings.
      f. Salvageable items to be retained by Owner as indicated on Drawings and during the pre-construction job walk.

### 1.3 DEFINITIONS

A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain Owner's property.

B. Remove and Salvage: Items indicated to be removed and salvaged remain Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to location as directed by Owner's representative.

C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse. Store and protect against damage. Reinstall items in locations indicated.

D. Existing to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by Owner's representative, items may be removed to a suitable, protected storage location during demolition and then cleaned and reinstalled in their original locations.

E. Replace: Remove and legally dispose of existing item(s) indicated and install new like item(s) that conform to Project Specifications.

### 1.4 QUALITY ASSURANCE

A. Comply with the following:
   1. Applicable codes, ordinances, and regulations of local, municipal, state, and federal authorities having jurisdiction.
   2. Comply strictly Fugitive Dust Control, Bay Area Air Quality Management District
   3. Obtain necessary permits and notices; post where required.
   4. Comply with safety requirements of the local fire department.
   5. Comply with ANSI A10.6.

B. Notify affected utility companies before starting Work and comply with their requirements.

C. Carefully perform demolition work by skilled workers experienced in building demolition procedures, using appropriate tools and equipment. Perform work, at all times, under the direct supervision of a supervisor approved by Owner's inspector.

D. Coordinate demolition with other trades to ensure correct sequence, limits, and methods of proposed demolition. Schedule work to create least possible inconvenience to the public and to facility operations.

E. Pre-Demolition:
   1. Conduct conference at Project site seven (7) days prior to scheduled installation:
      a. Conference agenda shall include review and discussion of requirements of authorities having jurisdiction, instructions and requirements of serving utilities, sequencing and interface considerations, and Project conditions.
      b. Conference shall be attended by supervisory and quality control personnel of Contractor and all subcontractors performing this and directly related work. Submit minutes of meeting to design builder's representative for Project record purposes.

F. Ownership of Materials:
   1. Except for items or materials indicated to be reused, salvaged, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from the site with further disposition at Contractor's option.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Items scheduled for salvage by Owner shall be delivered to a location designated by Owner's authorized representative. Items shall be cleaned, packaged, and labeled for storage.

B. Items scheduled for reuse shall be stored onsite and protected from damage, soiling, and theft.

C. Follow legal requirement to hand expose to the point of no conflict 24 inches on either side of the underground facility, so its exact location is known before using power equipment.

D. Note: If caught digging without a Dig Alert ticket, a fine of up to fifty thousand dollars ($50,000.00) may be assessed per California government code 4216.

# PART 2 PRODUCTS

## 2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: The onsite shallow sands encountered in the borings are considered non-expansive and following proper processing should be suitable for backfilling purposes provided they are free of deleterious materials and oversize particles. Import materials may also be used for backfilling. The onsite or imported materials being used for backfilling should be non-expansive (EI less than 20), and should be in compliance with the specifications of the Project's soils report.

B. Backfill and Native Fill Materials: The onsite soils may be reused as compacted engineered fill provided they comply with the requirements of satisfactory soil materials as described above.

C. Engineered Fill: Satisfactory soil materials/borrow fill material, as described above, placed in lifts no greater than eight inches (8") thick (loose measurements) and each lift moisture conditioned. All engineered fill should be densified to a minimum relative compaction of 90

percent per ASTM D1557.

D. Backfill Material for Trenches: The onsite soils have been determined to be suitable for being used for backfilling purposes in trenches. Utility trenches should be backfilled with granular materials and mechanically compacted to at least 90 percent of the maximum dry density of the soils.

## PART 3 EXECUTION

### 3.1 PROJECT CONDITIONS

A. Drawings may not indicate in detail all demolition work to be carried out. Carefully examine existing conditions to determine full extent of demolition required. All utilities, whether shown on Drawings or not, to be capped at the property line U.N.O.

B. Repair damage due to demolition activities to existing improvements to remain at no additional cost to Owner. Repair or replace as directed by Owner's inspector.

C. Take measures to avoid excessive damage from inadequate or improper means and methods, or improper shoring, bracing, or support. Repair or replace any resulting damage at no additional cost to Owner as directed by Owner's inspector.

D. If conditions are encountered that vary from those indicated, notify Owner's inspector for instructions prior to proceeding. Owner assumes no responsibility for actual condition of structures to be demolished.

E. Inform Owner immediately upon discovery of asbestos products, radioactive materials, toxic wastes, or other hazardous materials. Do not remove hazardous materials without Owner authorization.

F. Adjacent roadways/passageways:
   1. Maintain fire department access through all phases of the Project.
   2. Obstruction of streets, walks, or other adjacent facilities will not be allowed.

### 3.2 DIG ALERT NOTIFICATION

A. Before any excavation in or near the public right-of-way, Contractor must contact the Underground Service Alert or USA-North (Dig Alert) at 811 or 800-642-2444 for information on buried utilities and pipelines.

B. Delineation of the proposed excavation site is mandatory. Mark the area to be excavated with water soluble or chalk based white paint on paved surfaces or with other suitable markings such as flags or stakes on unpaved areas.

C. Call at least two (2) full working days prior to digging.

D. If the members (utility companies) have facilities within the work area, they will mark them prior to the start of excavation; if not, they will provide notice of no conflict. A different color is used for each utility type (electricity is marked in red, gas in yellow, water in blue, sewer in green, telephone and cable TV in orange).

### 3.3 GENERAL

A. Protection:
   1. Do not begin demolition until safety partitions, barricades, warning signs, and other

forms of protection are installed.
2. Provide safeguards, including warning signs, lights and barricades, for protection of occupants and the general public during demolition.
3. Provide and maintain fire extinguishers. Comply with requirements of governing authorities.
4. Maintain existing utilities that are to remain in service and protect from damage during operations.

B. Safety: If at any time safety of existing construction appears to be endangered, take immediate measures to correct such conditions; cease operations and immediately notify Owner's inspector. Do not resume demolition until directed by Owner's inspector.

C. Noise and Dust Abatement: Exercise all reasonable and necessary means to abate dust, dirt rising, and undue noise. Perform necessary sprinkling and wetting of construction site to allay dust as required by applicable codes and ordinances.

D. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations. Do not create hazardous or objectionable conditions, such as flooding and pollution, when using water.

E. Water for Dust Control: Contractor shall obtain and pay for all water required for dust control operations. This may include, but is not limited to, payment of deposits to utility for construction meter, and payment of all monthly service and water charges. Construction meter shall be in place throughout construction period unless alternative arrangements are made with the City of Santa Rosa Water Department to provide construction water for all purposes. Contractor shall be aware of water moratoriums and restrictions, and shall immediately advise Owner of effects on construction schedules.

F. An eight-foot-high (8') chain link fence and gates shall be erected prior to any demolition operations at the construction limits perimeter. Coordinate the exact location with Owner.

G. Debris Removal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level.

H. Progress Cleaning: Clean adjacent buildings and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing before start of demolition.

I. Where performing contracted scope of work requires coring of existing concrete, brick masonry, or CMU structures (including walls, floors, and sitework), Contractor shall obtain and document means of verifying existence and location of embedded steel reinforcing materials within said concrete, brick, and CMU assemblies. Contractor shall locate reinforcement by means of noninvasive technology, such as X-ray photography, for the purposes of protecting said reinforcement in place and shall not damage any reinforcement materials (rebar, etc.) unless specifically detailed as such and approved by the authority having jurisdiction.

J. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

K. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

L. Contractor shall provide temporary weather protection during interval between demolition and removal of existing construction, on exterior surfaces, and new construction to ensure that no water leakage or damage occurs to structure or interior areas.

M. Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of building to be selectively demolished.

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

O. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials if exposed; repaired surfaces shall match existing adjacent surface color finish and texture:
   1. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction to remain in a manner that eliminates evidence of patching and refinishing.

P. Disposal: Promptly dispose of demolished materials; do not allow demolished materials to accumulate onsite.

## 3.4 PREPARATION

A. Prevent movement or settlement of adjacent structures. Provide bracing and shoring as necessary.

B. Utilities:
   1. The Drawings do not purport to show all below-grade conditions and objects on the site. Contractor shall perform field investigations as necessary to establish location of underground utility services and other features affecting earthwork.
   2. Mark location of underground utilities on asphalt pavement with paint.
   3. Disconnect and cap utility services; comply with requirement of governing authorities.
   4. Contractor shall arrange and notify utility company in advance of date and time when service needs to bedisconnected.
   5. Do not commence demolition operations until associated disconnections have been completed.
   6. Should utilities and other below-grade conditions be encountered that adversely affect the Work, discontinue affected Work and notify Owner's representative and Architect and request direction. Unforeseen conditions will be resolved in accordance with provisions of the General Conditions of the Contract.
   7. Should a utility line or structure be damaged, immediately notify the responsible utility company or agency and notify Owner’s representative and Architect:
      a. Repair or replace all damaged utility lines and structures as directed by the responsible utility company oragency.
      b. Repair or replacement of damaged utility lines and structures whose location or existence has been made known to Contractor shall be at no change in the Contract Time and Contract price.

C. Structures to be demolished shall be inspected for hazardous materials; such materials shall be removed and disposed of before general demolition begins.

D. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by Owner's representative and authority having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner's representative and authority having jurisdiction.

## 3.5 EXPLOSIVES

A. Explosives: Use of explosives will not be permitted.

## 3.6 DEMOLITION

A. Demolition, General:
   1. With certain exceptions, Contractor shall raze, remove, and dispose of all buildings and foundations, structures, paving, fences, and other obstructions that lie wholly or partially within the construction limits identified on Drawings. The exceptions are utility-owned equipment and any other items the Owner/Documents may direct Contractor to leave intact or re-use onsite. Cease demolition immediately if adjacent structures appear to be in danger.
   2. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
   3. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner's representative and authority having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
   4. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area:
      a. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
      b. Protect existing site improvements, appurtenances, and landscaping to remain.
      c. Completely remove below-grade construction, including foundation walls and footings.
   5. Damages: Promptly repair damages to adjacent facilities caused by demolition operations.
   6. Unless otherwise indicated on the Plans, remove all demolished material from the site and dispose of at approved disposal sites. Comply with all requirements for recycling of demolished material as called for in Division 01 of this Specification. Contractor shall obtain necessary permits for the transportation of material from the site.

## 3.7 REMOVAL OF EXISTING PLUMBING AND ELECTRICAL EQUIPMENT AND SERVICES

A. Remove existing plumbing and electrical equipment fixtures and services not indicated for reuse and not necessary for completion of Work. Remove abandoned lines and cap unused portions of existing lines. Contractor is responsible for completely surveying the site and locating all existing utilities, above and below ground, before contracting to perform the work.

B. Asbestos – Cement (A-C) Pipe Removal and Disposal: The Plans for the Project may indicate that existing asbestos-cement pipe is to be removed from the ground. Where so indicated, Contractor shall excavate with care, expose the pipeline, and remove the A-C pipe to the nearest joint. Should the Plans not call out the removal of the A-C pipe and A-C pipe is encountered, Contractor shall obtain approval from Owner as to whether or not the A-C pipe is to be removed or can be left in place. Cutting of the pipe shall only be done if there is no other way to expose the length of pipe to the nearest joint that be separated and Owner approves the cutting of the pipe. Cutting of the pipe shall be done with a mechanical saw with a pressure water source to dampen the pipe and the dust from the cutting. To remove a coupling, the coupling may have to be broken in the trench. The pipe once removed from the trench may be broken for handling. The breaking shall be done within a plastic bagging or sheeting material to minimize the release of asbestos fibers into the atmosphere. Once removed and broken, if necessary, the A-C material shall be bagged and disposed of legally with Owner being given a copy of all Contractor paperwork as to the legal disposal of the material. If the A-C pipe section(s) are removed intact, the pipe can be removed by

Contractor from the Project site and become the property and responsibility of Contractor.

## 3.8 CLEANING

A. Clean existing materials to remain, using appropriate tools and materials.

B. Protect adjacent materials and equipment during cleaning operations.

## 3.9 RESTORATION

A. Restoration of Site Finishes:
   1. Concrete paving: Where it is necessary to excavate a trench across, make a cut in concrete paved areas, cut concrete with cutting saw, full depth of paving.
   2. Bituminous paving: Where it is necessary to excavate a trench across, make a cut in bituminous paved areas, either first score paving with a concrete cutting saw, in neat straight lines, prior to removing paving, or make straight cuts with pneumatic spade.
   3. Restoration of paving: Restore all paved areas to their original condition using material of like type and quality as the removed paving. Paving in public ways shall conform to applicable requirements of authorities having jurisdiction. Repaired surfaces shall match existing adjacent paving except minimum depth shall be 3-1/2 inches where existing paving is less than 3-1/2 inches.
   4. Restoration of landscape planting: Restore soil and plant materials to match original condition, including additional topsoil, topsoil grading and preparation, new plant materials, and plant maintenance during establishment period.

## 3.10 MAINTENANCE

A. Install and maintain all erosion control devices, including sandbag and gravel bag dikes, silt fences, de-silting basins, inlet barricades, vehicle wash traps, and other features called for in the Storm Water Pollution Prevention Plan and Temporary Erosion Control Plans.

## 3.11 CLEAN-UP/DISPOSAL

A. Coordinate building access with the Owner's inspector. Review and schedule waste storage and removal, include truck access to site.

B. Debris shall be dampened by fog water spray prior to transporting by truck.

C. Debris pick-up area shall be kept broom-clean and shall be washed daily with clean water.

D. Remove waste and debris other than items to be salvaged. Turn over salvaged items to Owner, or store and protect for reuse where scheduled. Continuously clean-up and remove items as demolition work progresses. Do not allow waste and debris to accumulate in building or onsite.

**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 other Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

A. Section Includes: Requirements including but not limited to:
   1. Demolition and removal of selected portions of building or structure.
   2. Demolition and removal of selected portions of existing built-up roof.
   3. Demolition and removal of existing mechanical equipment.
   4. Accessories necessary for demolition and deconstruction.

### 1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose offsite.

B. Remove and Reinstall: Detach items from existing construction with care to prevent damage, clean and refurbish, prepare for reuse, store as necessary, and reinstall where indicated.

C. Deconstruct: To remove by disassembling or detaching an item from a surface, using methods and equipment to successfully prevent damage to the item and surfaces; and dispose of items.

### 1.4 MATERIALS OWNERSHIP

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

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and the contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

### 1.5 SUBMITTALS

A. Qualification Data: Submit copies of qualifications for refrigerant recovery technician.

B. Engineering Survey: Submit engineering survey of condition of building, and roof structures.

C. Proposed Protection Measures: Submit report, including Drawings, indicating proposed measures for protecting individuals and property, for environmental protection, dust control and noise control. Indicate proposed locations, types, and construction of barriers.

D. Schedule of Selective Demolition Activities:
   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on site operations are uninterrupted.
   2. Interruption of utility services. Indicate how long utility services will be interrupted.
   3. Coordination for shutoff, capping, and continuation of utility services.
   4. Use of elevator and stairs.
   5. Coordination of Owner's continuing occupancy of portions of existing building and of

Owner's partial occupancy of completed Work.

E. Inventory: Submit a list of items for removal and location of storage of existing items to be removed saved and replaced (Tile Roofing)

F. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces that could be construed as damage caused by demolition operations. Comply with Section 013230. Submit prior to commencement of the work.

G. Statement of Refrigerant Recovery: Submit statement signed by refrigerant recovery technician responsible for recovering refrigerant, stating that refrigerant present was recovered and recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

H. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

## 1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Demolition Standards: Comply with ASSE A10.6 and NFPA 241.
2. Comply with EPA regulations prior to commencement of the work. Comply with hauling and disposal regulations of authorities having jurisdiction.
3. Comply with applicable federal, state, and local codes for demolition work, dust and noise control, safety of structure, and debris removal.
4. Obtain required permits from authorities having jurisdiction.

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

C. Pre-Demolition Conference: Conduct conference at the site.
1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction scheduled to remain and requires protection.
6. Review with Owner; on site staging areas for equipment and material storage and waste containment bins location and access.
7. Security for building access and site access as well as for items noted in 6.

## 1.7 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Provide minimum of 72 hours' notice to Owner of demolition activities that will affect Owner's operations including but not limited to:
1. Interruption of power.
2. Interruption of utility services.
3. Excessive noise.
4. Heavy equipment access to site.

B. Condition of Structure: Conditions existing at time of inspection will be maintained by

Owner as far as practical. Owner assumes no responsibility for actual condition of items or structures to be demolished.

1. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
2. Before commencing selective demolition, Owner will remove the following items:
   a. Classroom equipment (Tables, Chairs and District owned items).

C. Hazardous Materials: It is not anticipated that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

D. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by at least 12 inches (300 mm).

E. Storage or sale of removed items or materials on site is not permitted.

F. Traffic: Conduct operations and debris removal to ensure minimum interference with roads, streets, drives, fire lanes, walks, accessible paths, and adjacent occupied or used facilities.

1. Do not close, block, or obstruct streets, drives, walks, or occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around obstructed traffic ways.

G. Explosives: Explosives are NOT permitted at the site.

H. Flame Cutting: Do not use cutting torches for removal until flammable materials are removed. At concealed spaces, verify conditions prior to flame cutting operations. Maintain portable fire suppression devices during flame cutting operations.

I. Environmental Controls: Use water sprinkling, temporary enclosures, or other acceptable methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection. Do not use water when it may create hazardous or objectionable conditions.

J. Utility Services: Maintain existing utilities and protect against damage during demolition operations.

1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, acceptable to Owner and governing authorities.

K. Protections: Provide temporary barriers to protect Owner's personnel and public from injury from work.

1. Take protective measures to provide free and safe passage to occupied portions of building.
2. Provide protection to ensure safe passage of the Owner’s personnel and the public around demolition areas and to and from occupied portions of adjacent areas, buildings, and structures.
3. Provide 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 existing work which becomes exposed during demolition operations.
   a. Protect existing improvements, appurtenances, and conditions to remain.
   b. Protect adjacent floors with coverings.

c. Protect walls, openings, roofs, and adjacent exterior construction to remain and exposed to building demolition operations.

5. Construct temporary insulated dustproof partitions to separate areas from noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks. Refer to Drawings for location of partitions to be provided.
6. Provide temporary weather protection when exposing exterior conditions to prevent water leakage or damage to structure or interior areas of existing building.

L. Damages: Promptly repair damages caused to adjacent facilities by demolition work.

## 1.8 COORDINATION

A. Arrange selective demolition schedule to avoid interference with Owner's and the school's operations.

## 1.9 WARRANTY

**A.** Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor prior to proceeding. Existing warranties to be provided by Owner prior to the start of construction.

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying existing system has been inspected and warranty remains in effect. Submit supporting documentation at closeout.

# PART 2 PRODUCTS

## 2.1 MATERIALS

A. Repair Materials: Use repair materials identical to existing materials.
1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
2. Use materials whose installed performance equals or surpasses that of existing materials.

B. Comply with material and installation requirements specified in individual Specification Sections.

# PART 3 EXECUTION

## 3.1 EXAMINATION

A. Verify that affected utilities have been disconnected and capped before commencing selective demolition operations.

B. Review Project Record Documents of existing construction or existing condition and hazardous material information provided by Owner. Owner does not warrant existing conditions are same as those indicated in Project Record Documents.

C. Perform an engineering survey of condition of building to determine whether removing an element might result in structural deficiency or unplanned collapse of a portion of structure or adjacent structures during selective building demolition operations.
1. Perform surveys as the work progresses to detect hazards resulting from selective

demolition activities.

D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.

E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

F. Survey of Existing Conditions: Record existing conditions with measured drawings or preconstruction photographs or video and templates.
   1. Inventory and record the condition of items to be removed. Provide photographs or video of conditions that might be misconstrued as damage caused by operations.
   2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final work, make permanent record of measurements, materials, and construction details required to make exact reproduction.
   3. For any electrical or low-voltage work to be performed in the project (including fire alarm, PA, intercom, or data), test entire system for operation prior to initiation of work. Notify Owner of any non-working components. Test entire system at the end of construction to ensure all systems operate properly.

## 3.2 PREPARATION

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

B. Pest Control: Employ certified, licensed exterminator to treat building and to control rodents and vermin before and during selective demolition operations.

C. Site Access and Temporary Controls: Conduct selective demolition and debris removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities. Comply with requirements for access and protection.

D. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
   2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
   3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
   4. Cover and protect furniture, furnishings, and equipment that have not been removed.
   5. Comply with requirements for temporary enclosures, dust control, heating, and cooling.

E. Furnishings and Equipment: Cover and protect furniture, equipment, and fixtures from spoilage or damage as necessary.

F. Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
   1. Construct dustproof partitions of not less than nominal 4 inch (100mm) studs, 5/8 inch (16mm) gypsum wallboard with joints taped on occupied side, and 1/2 inch (13mm) fire retardant plywood on the demolition side.
   2. Insulate partition to provide noise protection to occupied areas.
   3. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
   4. Protect air handling equipment.

5. Weatherstrip openings to prevent the spread of dust.

## 3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off 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. Arrange to shut off utilities with utility companies.
   3. 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.
   4. Disconnect, demolish, and remove fire suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings 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 and leave in place.
      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: 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 and leave in place.

## 3.4 POLLUTION CONTROLS

A. Dust Control: Use water mist, temporary enclosures, and suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations including, Bay Area Air Quality Management District (Fugitive Dust).
   1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
   2. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.

## 3.5 PROTECTION

A. Temporary Protection: Provide temporary barricades and protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
      a. Erect temporary pathways and means of egress necessary for ongoing operations compliant with Code and accessibility regulations.
      b. Provide temporary barricades and protection required to prevent injury and damage to adjacent buildings and facilities to remain.
   2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
   a. Protect existing work which becomes exposed during demolition operations.
   b. Protect adjacent entrances from damage due to demolition activities.
   c. Protect existing improvements, appurtenances, and conditions to remain.
   d. Protect floors with covering.
   e. Protect walls, openings, roofs, and adjacent exterior construction to remain and exposed to building demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 50 00.
   a. Construct temporary insulated dustproof partitions to separate areas from noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks.
   b. Construct dustproof partitions of not less than nominal 4 inch (100mm) studs, 5/8 inch (16mm) gypsum wallboard with joints taped on occupied side, and 1/2 inch (13mm) fire retardant plywood on the demolition side.
   c. Insulate partition to provide noise protection to occupied areas.
   d. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
   e. Protect air handling equipment.
   f. Weatherstrip openings.
6. Damage: Promptly repair damages to adjacent components cause by demolition activities.

B. Temporary Shoring: Design, 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.

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

## 3.6 SELECTIVE DEMOLITION

A. Demolish and remove existing construction to the extent necessary for new work. Use methods required to complete the work within limitations of governing regulations and as follows:
   1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
   2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
   3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame cutting operations. Maintain portable fire suppression devices during flame cutting operations.
   5. Maintain fire watch during and for at least 24 hours after flame cutting operations.
   6. Maintain adequate ventilation when using cutting torches.
   7. Remove decayed, vermin infested, and dangerous or unsuitable materials and promptly dispose of offsite.
   8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

9. Locate selective demolition equipment and remove debris and materials to avoid imposing excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly.

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

C. Removed Items: Clean and pack or crate items after cleaning. Identify contents of containers. Store items in secure area until delivery to Owner.
1. Transport items to Owner's storage area designated by Owner. Protect items from damage during transport and storage.

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

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

F. Patching and Repair: Repair damage to adjacent construction caused by selective demolition operations promptly.

## 3.7 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. At existing parapets, remove portions of roofing, flashing, stone, and masonry necessary to weld new steel and set form work. Provide temporary watertight enclosures over areas of open roof and temporarily flash to make watertight.

B. As column forms are placed, temporarily flash columns to existing roofing and cover with watertight tarpaulins before and after pouring. After column forms have been removed, temporarily flash new concrete structure into existing roofing immediately to maintain watertight roof.

C. When removing roofing to place supports for shoring of form work to transfer loads to existing columns or approved structure or to support scaffolding, work platforms, or similar loads, temporarily flash supports to make roof watertight.

D. Remove excess residue. Thoroughly clean and remove asphalt, dust, loose materials and leave ready for new work.

## 3.8 PATCHING AND REPAIRS

A. Promptly repair damage to adjacent construction caused by selective demolition operations.

B. Patching: Comply with Section 01 73 29.

C. Repairs: When necessary to repair to existing surfaces, patch to produce surfaces suitable for new materials.

1. Fill holes and depressions in existing masonry walls to remain with masonry patching material applied according to manufacturer's written recommendations.

D. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

E. Floors and Walls: Where walls or partitions are demolished, extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
1. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
2. Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.
3. Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

F. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

## 3.9 DISPOSAL OF DEMOLISHED MATERIALS

A. Legally remove demolition waste materials from site and dispose in an EPA approved construction and demolition waste landfill acceptable to authorities having jurisdiction recycle or reuse components.
1. Do not allow demolished materials to accumulate on site.
2. Remove and transport debris to prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or devices that conveys debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

## 3.10 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 02 82 00 ASBESTOS REMEDIATION

## 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 requirements including but not limited to:
   1. Asbestos material abatement and disposal.
   2. Accessories necessary for complete removal.

B. Related Sections:
   1. Refer to Bidding and Contract Documents.

### 1.3 SUBMITTAL

A. Submit copy of the signed waste manifests indicating the place, time, and exact quantity of asbestos received by an approved landfill.

### 1.4 QUALITY ASSURANCE

A. Qualifications: Entity having minimum five (5) years' documented experience, holding required current licenses for the removal, transport, disposal, and related activities relative to the work, having the required personal protective equipment for abatement operations, with current liability insurance, and who employs workers fully trained and knowledgeable in the removal of hazardous materials.

B. Stop Asbestos Removal:
   1. If a verbal or written Stop Asbestos Removal Order is given**,** immediately stop asbestos removal and maintain HEPA filtered negative pressure air flow in the containment and adequately wet any exposed Asbestos Contained Material (ACM).
   2. Do not resume asbestos removal activity until authorized to do so in writing from District.
   3. A stop asbestos removal order may be issued at any time by the District if it is determined that abatement conditions/activities are not within regulatory requirements or that an imminent hazard exists to human health or the environment.
   4. Work stoppage will continue until conditions have been corrected.

## PART 2 MATERIALS (NOT USED)

## PART 3 EXECUTION

### 3.1 REMEDIATION

A. Owner has conducted an asbestos survey and has determined that asbestos may be present in areas where Work will be performed. The survey is made available for review:
   1. As part of the Work, Owner requires asbestos removal to be performed under the construction Contract.
   2. Asbestos may be present in vinyl tile under architectural woodwork or covered by, but

not encapsulated, carpet materials and other types of flooring.
3. Asbestos may be present in the ductwork above the ceiling panels.
4. If asbestos is found, stop work in the area and engage an asbestos removal firm to remediate the asbestos from the area. Do not resume work in the affected areas until the abatement is complete and authorization to proceed with work in the affected areas is given. Work in areas not affected by asbestos may continue.

B. Assume responsibility and liability for compliance with applicable federal, state, and local regulations related to the asbestos abatement work:
1. Provide and maintain training, accreditations, medical exams, medical records, and personal protective equipment (PPE) including respiratory protection and respirator fit testing, as required by applicable federal, state, and local regulations.
2. Post required notices prior to the commencement of the work.
3. Restrict access to containment areas to authorized, trained, and protected personnel.
4. Prepare and post an emergency plan in clean room and equipment room of the decontamination unit.
5. Do not permit workers to eat, drink, smoke, chew gum or tobacco, or break the protection of the respiratory protection system in the work area.

C. Entering and Existing Procedures: Establish procedures for entering and existing containment area. Provide personnel decontainment unit with disposable coveralls, head covers, and clean respirators. Provide shower room between personnel decontainment area and equipment room.

D. Decontamination Procedures: Establish and ensure that procedures for decontamination upon leaving containment area are in accordance with federal and state regulations.

E. Provide negative pressure filtration systems to complete air exchange four (4) times per hour. Provide standby system in the event of a machine failure or emergency:
1. Continuously monitor and record the pressure differential between the work area and the building outside of the work area.

F. Prepare the Affected Area: Remove furnishings and materials to the extent necessary to remediate the asbestos.

G. Containment of Areas:
1. Provide a secure containment work area in accordance with federal and state regulations. Avoid damage to existing partitions and ceilings scheduled to remain to the extent possible:
a. Establish critical barriers over each opening into the work area.
b. Close out vents and air ducts to prevent particulates from entering the HVAC system.

H. Debris:
1. Place contaminated debris in a designated location within the containment area:
a. Place debris in minimum six (6) mil poly bags before removing from contaminated areas. Pass clean or decontaminated bags through a double six (6) mil flap doorway into another bag or fiber drum. Remove to disposal dumpster/gondola/vehicle. Do not permit unprotected personnel to come in contact with contaminated bags.
b. Remove and dispose of contaminated debris legally.

I. Testing: Perform required tests and inspections upon completion of the work. Collect air samples and analyze in accordance with regulations. Upon satisfactory conclusion of testing, remove critical barriers.

J. After thorough decontamination, complete asbestos abatement work upon meeting the regulated area clearance criteria and fulfilling the following:
   1. Remove equipment, materials, and debris from the Project area.
   2. Package and dispose of asbestos waste, as required.
   3. Repair or replace all interior finishes damaged during the abatement work.
   4. Fulfill other Project closeout requirements as specified elsewhere in this Specification.

## 3.2 CERTIFICATE OF COMPLETION BY CONTRACTOR

A. Submit a signed *Certificate of Completion* at the completion of the abatement and decontamination of the regulated area.

**END OF SECTION 02 82 00**

# SECTION 02 83 00 LEAD-BASED MATERIALS REMEDIATION

## 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 requirements including but not limited to:
   1. Recognition of lead-based material and its definition.
   2. Federal and state requirement reference.
   3. Contractor’s Liability.
   4. Contractor’s Acknowledgment.

B. Related Sections:
   1. Refer to Bidding and Contract Documents.

C. Lead as a Health Hazard:
   1. Lead poisoning is recognized as a serious environmental health hazard facing children today. Even at low levels of exposure - much lower than previously believed - lead can impair the development of a child's central nervous system, causing learning disabilities and leading to serious behavioral problems. Lead enters the environment as tiny lead particles and lead dust disburses when paint chips or chalks peels or wears away over time, or is otherwise disturbed. Ingestion of lead dust is the most common pathway of childhood poisoning; lead dust gets on a child’s hands and toys and then into a child’s mouth through common hand-to-mouth activity. Exposures may result from construction or remodeling activities that disturb lead paint, from ordinary wear and tear of windows and doors, or from friction on other surfaces.
   2. Ordinary construction and renovation or repainting activities carried out without lead-safe work practices can disturb lead-based paint and create significant hazards. Improper removal practices, such as dry scraping, sanding, or water blasting painted surfaces, are likely to generate high volumes of lead dust.
   3. Because Contractor and his employees will be providing services for the District, and because Contractor's work may disturb lead-containing building materials, CONTRACTOR IS HEREBY NOTIFIED of the potential presence of lead-containing materials located within certain buildings utilized by the District. All school buildings built prior to 1978 are presumed to contain some lead-based paint until sampling proves otherwise.
   4. Refer to “Appendix 1: Requirements for Disturbance of Lead” in this Project manual.
   5. Education Code section 32240 et seq. is known as the Lead-Safe Schools Protection Act. Under this act, the Department of Health Services is to conduct a sample survey of schools in the State of California for the purpose of developing risk factors to predict lead contamination in public schools (Ed. Code, § 32241).
   6. Any school that undertakes any action to abate existing risk factors for lead is required to utilize trained and state-certified contractors, inspectors, and workers (Ed. Code, § 32243, sub. [b]). Moreover, lead-based paint, lead plumbing, solders, or other potential sources of lead contamination shall not be utilized in the construction of any new school facility, or the modernization or renovation of any existing school facility (Ed. Code, § 32244).
   7. Both the Federal Occupational Safety and Health Administration (Fed/OSHA) and the California Division of Occupational Safety and Health (Cal/OSHA) have implemented safety orders applicable to all construction work where a contractor's employee may be

occupationally exposed to lead.

8. The OSHA Regulations contain specific and detailed requirements imposed on contractors subject to that regulation. The OSHA Regulations define construction work as work for construction, alteration, and/or repair, including painting and decorating. It includes, but is not limited to, the following:
   a. Demolition or salvage of structures where lead or materials containing lead are present.
   b. Removal or encapsulation of materials containing lead.
   c. New construction, alteration, repair, or renovation of structures, substrates, or portions thereof that contain lead, or materials containing lead.
   d. Installation of products containing lead.
   e. Lead contamination/emergency cleanup.
   f. Transportation, disposal, storage, or containment of lead or materials containing lead on the site or location at which construction activities are performed.
   g. Maintenance operations associated with the construction activities described within this Section.
9. Because it is assumed by the District that a portion of painted surfaces (interior as well as exterior) within the District contain some level of lead, it is imperative that Contractor, workers, and subcontractors fully and adequately comply with all applicable laws, rules, and regulations governing lead-based materials, including title 8, California Code of Regulations, section 1532.1.
10. Contractor shall notify the District if any Work may result in the disturbance of lead-containing building materials. Any and all Work that may result in the disturbance of lead-containing building materials shall be coordinated through the District. A signed copy of this Certification shall be on file prior to beginning Work on the Project, along with all current insurance certificates.

D. Renovation, Repair, and Painting Rule:
   1. Toxic Substance Control Act Section 402(a):
      a. The EPA requires lead safe work practices to reduce exposure to lead hazards created by renovation, repair, and painting activities that disturb lead-based paint. Pursuant to the Renovation, Repair and Painting Rule (RRP), renovations in homes, childcare facilities, and schools built prior to 1978 must be conducted by certified renovations firms, using renovators with training by a EPA-accredited training provider, and fully and adequately complying with all applicable laws, rules, and regulations governing lead-based materials, including those rules and regulations appearing within title 40 of the Code of Federal Regulations as part 745 (40 CFR 745).
      b. The RRP requirements apply to all contractors who disturb lead-based paint in a six (6) square foot or greater area indoors or a 20 square foot or greater area outdoors. If a DPH-certified inspector or risk assessor determines that a structure constructed before 1978 is lead-free, the federal certification is not required for anyone working on that particular building.

## 1.3 SUBMITTAL

A. Contractors Acknowledgment (bottom of Section).

B. Submit copy of the signed waste manifests indicating the place, time, and exact quantity of material received by an approved landfill.

## 1.4 CONTRACTOR'S LIABILITY

A. If Contractor fails to comply with any applicable laws, rules, or regulations, and that failure results in a site or worker contamination, Contractor will be held solely responsible for all costs involved in any required corrective actions, and shall defend, indemnify, and hold

harmless the District, pursuant to the indemnification provisions of the Contract, for all damages and other claims arising therefrom.

B. If lead disturbance is anticipated in the Work, only persons with appropriate accreditation, registrations, licenses, and training shall conduct this Work.

C. It shall be the responsibility of Contractor to properly dispose of any and all waste products, including, but not limited to, paint chips, any collected residue, or any other visual material that may occur from the prepping of any painted surface. It will be the responsibility of Contractor to provide the proper disposal of any hazardous waste by a certified hazardous waste hauler. This company shall be registered with the Department of Transportation (DOT) and shall be able to issue a current manifest number upon transporting any hazardous material from any Project site.

D. Contractor shall provide the District with any sample results prior to beginning Work, during the Work, and after the completion of the Work. The District may request to examine, prior to the commencement of the Work, the lead training records of each employee of Contractor.

**SECTION CONTINUES ON NEXT PAGE**

**CONTRACTOR HEREBY ACKNOWLEDGES UNDER PENALTY OF PERJURY THAT IT:**

1. HAS RECEIVED NOTIFICATION OF POTENTIAL LEAD-BASED MATERIALS ON OWNER'S PROPERTY;

2. IS KNOWLEDGEABLE REGARDING AND WILL COMPLY WITH ALL APPLICABLE LAWS, RULES, AND REGULATIONS GOVERNING WORK WITH, AND DISPOSAL OF, LEAD.

THE UNDERSIGNED WARRANTS THAT HE/SHE HAS THE AUTHORITY TO SIGN ON BEHALF OF AND BIND CONTRACTOR. THE DISTRICT MAY REQUIRE PROOF OF SUCH AUTHORITY.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

PROJECT/CONTRACT NO.: _____ (Project or Contract)

between SRCS District and _____ (Contractor or Bidder).

This certification provides notice to Contractor that:

1. Contractor's work may disturb lead-containing building materials.

2. Contractor shall notify the District if any work may result in the disturbance of lead-containing building materials.

3. Contractor shall comply with the Renovation, Repair, and Painting Rule, if lead-based paint is disturbed in a six (6) square-foot or greater area indoors or a 20-square-foot or greater area outdoors.

**END OF SECTION 02 83 00**

# SECTION 06 10 00 ROUGH CARPENTRY

## PART 1 GENERAL

### 1.1 DESCRIPTION:

A. Work Included: Rough carpentry, light hardware and miscellaneous items of work not included in another Section. This Section also includes:
   1. Structural wood supports, grounds, backing and blocking required for roof related construction.

B. Related Work Specified Elsewhere:
   1. Section 06 16 00: Sheathing.
   2. Section 07 21 00; Thermal Insulation.
   3. Section 07 52 19; Modified Bitumen Membrane Roofing System.
   4. Section 07 72 00; Roof Accessories.
   5. Section 07 92 00; Joint sealants.
   6. Section 09 21 16; Gypsum Board.

### 1.2 REFERENCES, CODES AND STANDARDS:

A. The following references, codes and standards are hereby made a part of this Section and carpentry work shall conform to applicable requirements therein except as otherwise specified herein or shown on the Drawings. Nothing contained in the Drawings or these Specifications shall be construed as permitting work which is contrary to code requirements.

B. "Standard Grading and Dressing Rule #16, of the West Coast Lumber Inspection Bureau".

C. "Grading Rules for Western Lumber" of the Western Wood Products Association.

D. "Standard Specifications for Grades of California Redwood Lumber" of the Redwood Inspection Service.

E. American Wood Preservers Assn. (AWPA) Standard C 2-77, "Lumber, Timbers, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes".

F. American Wood Preservers Bureau (AWPB) Quality Control Standards.

### 1.3 QUALITY ASSURANCE:

A. Lumber and plywood shall be grade or quality marked by WWPA, WCLIB, APA, AWPB or by other grading and inspection agencies acceptable to the Architect. Grade marks shall include the designation "S-DRY"(or "MC-15" as applies) where applicable. Grade and quality marks shall not be apparent on surfaces exposed in the finished work.

### 1.4 PRODUCT STORAGE:

A. Store kiln dried materials in enclosed areas, protected from moisture and separated from contact with concrete or soil.

## PART 2 PRODUCTS

### 2.1 MATERIALS:

A. Temporary Construction: Clean lumber at Contractor's option, rough or smooth, as usage requires.

B. Lumber Not Otherwise Specified or Noted: Douglas fir or larch, graded and grade marked according to Reference Standard 1.02 A or B, #1 grade.
   1. Boards: Construction Grade.

C. Plywood for roofs - as noted on plans.
   1. Plywood shall be fabricated with exterior glue.

D. Rough Hardware: Nails, spikes, bolts, screws, tacks and framing connectors of standard manufacture as required. Hot dip galvanize items exposed to moisture or to exterior and those items which are in contact with wood pressure treated with waterborne salts.
   1. Bolts and Nuts: ASTM A 307, Grade A.
   2. Lag Bolts: Fed. Spec. FF-B-561. Pre-drill per CBC.
   3. Nails: Fed. Spec. FF-N-101, common unless otherwise noted or specified.
   4. Joist Hangers and Framing Connectors: Simpson or approved equal.

E. Building Paper and Felt: Kraft waterproof building paper or 15# unperforated asphalt saturated rag felt per CBC sections 1401-1403

F. Framing connectors: Simpson Strong Tie Corp., or equal.

**2.2 MOISTURE CONTENT:**

A. 19% maximum for 2x thickness and less; 19% maximum for ¾" thickness greater than 2x and less than 4x; and 22% maximum for thickness greater than 4x.

**2.3 SIZES:**

A. Surfaced to "DRY" sizes. Sizes noted are nominal unless shown as net.

***2.4*** **SURFACING:**

A. All wood materials exposed in the finished work shall have resawn surfaces of clean natural color unless noted or specified otherwise. Concealed framing lumber shall be S4S.

**PART 3 EXECUTION**

**3.1 ERECTION AND INSTALLATION: CODE REFERENCES REFER TO CBC CODE.**

A. Framing: Conform to CBC where same covers points not indicated on Drawings. Properly lay out framing with pieces closely fitted, accurately plumbed, leveled and aligned and rigidly secured in place.

B. Except as specifically shown on Structural Drawings, cutting of all wood, etc., is limited to those cuts permitted by CBC.

C. Bridging and Blocking: Conform to CBC. Provide 2X blocking at intersections of finished surfaces for adequate bearing and at points where required to support fixtures, cabinets, hardware and other equipment mounted on walls.

D. Plywood (General): Unless more stringent requirements are indicated on the Drawings or required by Code, application of plywood shall be in accordance with recommendations of the American Plywood Association.

E. Connections and Fastenings: Conform to CBC. Unless otherwise specified or shown on the Drawings, conform to minimum nailing requirements of CBC. For bolted connections, provide washers under heads and nuts bearing on wood, and draw nuts tight. Retighten before closing in framing. Exercise care in nailing through exposed sheathing and siding and ensure that fasteners penetrate into framing members.

**END OF SECTION 06 10 00**

# SECTION 06 10 53 MISCELLANEOUS ROUGH CARPENTRY

## PART 1 GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Framing with dimension lumber.
   2. Rooftop equipment bases and support curbs.
   3. Wood blocking, cants, and nailers.
   4. Wood furring and grounds.
   5. Wood sleepers and platform wood flooring.
   6. Plywood backing panels.
   7. Accessories necessary for a complete installation.

### 1.3 DEFINITIONS

A. Boards or Strips: Lumber of less than two inches (2”) nominal (38 mm actual) size in least dimension.

B. Dimension Lumber: Lumber of two inches (2”) nominal (38 mm actual) or greater size but less than five inches (5”) nominal (114 mm actual) size in least dimension.

### 1.4 SUBMITTALS

A. Product Data:
   1. Submit each type of process and factory fabricated product. Indicate component and materials and dimensions and include construction and application details:
      a. Wood treatment:
         1) Submit data for wood preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained:
            a) Include data for fire retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by qualified independent testing agency.
            b) For fire retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
            c) For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to site.

B. Laboratory and Testing Reports:
   1. Laboratory test reports:
      a. Submit report for installation adhesives indicating compliance with requirements for low emitting materials.

b. Post installed anchors.
c. Metal framing anchors.

## 1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Building code: Comply with applicable requirements of CBC Chapter 23 for miscellaneous wood.
2. Fire retardant treated lumber and plywood by pressure process: Provide products with a flame spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
3. Level floor finishes to minimum requirement noted CBC Section 11B-302.1.

B. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

# PART 2 PRODUCTS

## 2.1 WOOD PRODUCTS

A. Lumber:
1. DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated:
a. Factory mark each piece of lumber with grade stamp of grading agency.
b. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
c. Dress lumber, S4S, unless otherwise indicated.
d. Maximum moisture content of lumber: 19 percent unless otherwise indicated.

B. Preservative Treatment by Pressure Process:
1. AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground:
a. Preservative chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
b. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
c. Kiln dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
d. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

e. Application - treat items indicated on Drawings and the following:
   1) Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
   2) Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

C. Fire Retardant Treatment:
   1. Where indicated as fire retardant treated, provide materials acceptable to authorities having jurisdiction, and with fire test response characteristics specified as determined by testing identical products per ASTM E84 by a qualified testing agency:
      a. Treatment shall not promote corrosion of metal fasteners.
      b. Exterior type: Comply with specified requirements for fire retardant treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
      c. Interior Type A: Provide treated materials with moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
      d. Design value adjustment factors:
         1) Test treated lumber according to ASTM D5664 and calculate design value adjustment factors according to ASTM D6841:
            a) For enclosed roof framing, framing in attic spaces, and where high temperature fire retardant treatment is indicated, provide material with adjustment factors of minimum 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for climatological zone.
      e. Kiln dry lumber after treatment to a maximum moisture content of 19 percent.
      f. Identify fire retardant treated wood with appropriate classification marking of qualified testing agency:
         1) For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
      g. Application:
         1) Treat items indicated on Drawings and the following:
            a) Framing for raised platforms.
            b) Concealed blocking.
            c) Roof framing and blocking.
            d) Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
            e) Plywood backing panels.
            f) Wood platform deck flooring.

D. Dimension Lumber Framing:
   1. Non load bearing interior partitions: Construction or No. 2 grade of any species.
   2. Other framing: Construction or No. 2 grade of any species.

E. Miscellaneous:
   1. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including but not limited to blocking, nailers, cants, grounds, furring, roof top equipment bases and support curbs, and utility shelving:
      a. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content of any species.
      b. For blocking not used for attachment of other construction, use utility, stud, or No. 3 grade lumber of any species provided that it is cut and selected to eliminate defects that interfere with attachment and purpose.
      c. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that interfere with attachment of work.
      d. For furring strips for installing plywood or hardboard paneling, select boards with

no knots capable of producing bent-over nails and damage to paneling.

e. Utility shelving:
   1) Lumber with 19 percent maximum moisture content of any of the following species and grades:
      a) Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Premium or No. 2 Common (Sterling) grade; NeLMA, NLGA, WCLIB, or WWPA.
      b) Mixed southern pine or southern pine No. 2 grade; SPIB.
      c) Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

F. Concealed Boards:
   1. 19 percent maximum moisture content of any of the following species and grades:
      a. Mixed southern pine or southern pine, No. 2 grade; SPIB.
      b. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
      c. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
      d. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
      e. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

G. Plywood Backing Panels (Sleepers):
   1. Equipment backing panels: Plywood, DOC PS 1, Exterior, C-C Plugged or Exposure 1, C-D Plugged, fire retardant treated, in thickness not less than 3/4 inch (19 mm) nominal thickness.

H. Fasteners:
   1. Provide fasteners of size and type indicated that comply with requirements:
      a. Where carpentry is exposed to weather, in ground contact, pressure preservative treated, or in area of high relative humidity, provide fasteners with hot dip zinc coating complying with ASTM A153/A153M.
      b. Nails, brads, and staples: ASTM F1667.
      c. Screws for fastening to metal framing: ASTM C1002 drywall type or ASTM C954 nonload bearing steel stud, length recommended by screw manufacturer for material being fastened.
      d. Power driven fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
      e. Post installed anchors:
         1) Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 mechanical, masonry, ICC-ES AC58 mechanical, concrete, ICC-ES AC193 adhesive, masonry, or ICC-ES AC308 adhesive, concrete as appropriate for the substrate:
            a) Material, interior: Carbon steel components, zinc plated to comply with ASTM B633, Class Fe/Zn 5.
            b) Material, exterior: Stainless steel with bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2.

I. Metal Framing Anchors:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. Cleveland Steel Specialty Co.
      b. KC Metals Products, Inc.

c. Phoenix Metal Products, Inc.
d. Simpson Strong-Tie Co., Inc.

2. Galvanized steel sheet: Hot dip, zinc coated steel sheet complying with ASTM A653/A653M, G60 (Z180) coating designation. Use for interior locations unless otherwise indicated.
3. Hot dip, heavy galvanized steel sheet - ASTM A653/A653M; structural steel (SS), high strength low alloy steel Type A (HSLAS Type A), or high strength low alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick. Use for wood preservative-treated lumber and where indicated:
   a. Stainless steel sheet: ASTM A666, Type 304 and Type 316 for exposed application in coastal environments. Use for exterior locations and where indicated.

J. Miscellaneous Materials:
1. Adhesives for gluing to concrete or masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.
2. Flexible flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized asphalt compound, bonded to high density polyethylene film, aluminum foil, or spunbonded polyolefin to produce overall thickness of not less than 0.025 inch (0.6 mm).

## PART 3 EXECUTION

### 3.1 INSTALLATION

A. Framing Standard: Comply with AF&PA WCD 1 Details for Conventional Wood Frame Construction unless otherwise indicated.

B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels:
1. Install fire retardant treated plywood backing panels with classification marking of testing agency exposed to view.

D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

E. Do not splice structural members between supports unless otherwise indicated.

F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim:
1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.

G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2,438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks

of same width as framing members and two-inch nominal (2") (38-mm actual) thickness.
3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 square feet (9.3 sq. m) and to solidly fill space below partitions.
4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet (6 m) o.c.

H. Sort and select lumber so natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

I. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative treated lumber:
1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

J. Where wood preservative treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

K. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. Table 2304.9.1 Fastening Schedule in the International Building Code.
2. ICC-ES evaluation report for fastener.

L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

M. Wood Blocking and Nailer Installation:
1. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved:
   a. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
   b. Provide permanent grounds of dressed, pressure preservative treated, key beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

## 3.2 SITE ENVIRONMENTAL PROCEDURES

A. Indoor Air Quality: Provide temporary ventilation during work. During and immediately after installation of treated wood, engineered wood products, and laminated wood products at interior spaces, provide temporary ventilation.

B. Waste Management:
1. Refer to Construction Waste Management and Disposal, and Construction Waste Management Plan from District:
   a. Select lumber sizes to minimize waste; reuse scrap lumber to the greatest extent possible. Clearly separate scrap lumber for use onsite as accessory components, including shims, bracing, and blocking.
   b. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

c. Prevent sawdust and wood shavings from entering the storm drainage system.
d. Do not burn scrap lumber that has been pressure treated.
e. Do not send lumber treated with pentachlorophenol, CCA, or ACA to cogeneration facilities or waste to energy facilities.

## 3.3 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron treated wood becomes wet, apply EPA registered borate treatment. Apply borate solution by spraying to comply with EPA registered label.

B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA registered borate treatment. Apply borate solution by spraying to comply with EPA registered label.

**END OF SECTION 06 10 53**

# SECTION 06 16 00 SHEATHING

## PART 1 GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Wall sheathing.
   2. Underlayment.
   3. Sheathing joint and penetration treatment.
   4. Accessories necessary for a complete installation.

### 1.3 SUBMITTALS

A. Product Data:
   1. Technical data for each type of process and factory fabricated product. Indicate component materials and dimensions and include construction and application details:
      a. Include data for wood preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
      b. Include data for fire retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
      c. For fire retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5516.
      d. For products receiving a waterborne treatment, include statement that moisture content of treated materials reduced to levels specified before shipment to Project site.
      e. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

### 1.4 QUALITY ASSURANCE

A. Fire Test Response Characteristics:
   1. For assemblies with fire resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E119 by a testing and inspecting agency acceptable to authorities having jurisdiction:
      a. Fire resistance ratings: Indicated by design designations from UL Fire Resistance Directory or GA-600 Fire Resistance Design Manual.

B. Testing Agency Qualifications: For testing agency providing classification marking for fire retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

### 1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

## PART 2 PRODUCTS

### 2.1 MATERIALS

A. Plywood: DOC PS 1.

B. Oriented Strand Board: DOC PS 2.

C. Thickness: As necessary to comply with requirements specified, but not less than thickness indicated.

D. Factory mark panels to indicate compliance with applicable standard.

### 2.2 PRESERVATIVE TREATED PLYWOOD

A. Preservative Treatment by Pressure Process - AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground:
   1. Preservative chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

### 2.3 FIRE RETARDANT TREATED PLYWOOD

A. Where fire retardant treated materials are indicated, use materials complying with requirements acceptable to authorities having jurisdiction and with fire test response characteristics specified determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire Retardant Treated Plywood by Pressure Process:
   1. Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test:
      a. Use treatment that does not promote corrosion of metal fasteners.
      b. Exterior type: Treated materials shall comply with requirements specified above for fire retardant treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
      c. Design value adjustment factors: Treated lumber plywood shall be tested according to ASTM D5516 and design value adjustment factors shall be calculated according to ASTM D6305. Span ratings after treatment shall be not less than span ratings specified. For roof sheathing and where high temperature fire retardant treatment is indicated, span ratings for temperatures up to 170 degrees F (76 degrees C) shall be not less than span ratings specified.

C. Kiln dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

D. Identify fire retardant treated plywood with appropriate classification marking of qualified testing agency.

E. Application:
   1. Treat plywood indicated on Drawings and the following:
      a. Roof and wall sheathing within 48 inches (1,220 mm) of fire walls.
      b. Subflooring and underlayment for raised platforms.

## 2.4 WALL SHEATHING

A. Glass Mat Gypsum Wall Sheathing - ASTM C1177/C1177M:
   1. Product is subject to compliance with requirements; provide products by one of the following:
      a. CertainTeed Corporation: GlasRoc (basis of design).
      b. Georgia Pacific: Dens-Glass.
      c. National Gypsum Company: Gold Bond eXP.
      d. United States Gypsum Co.: Securock.
   2. Type and thickness: Regular, 1/2 inch (12.7 mm) thick.
   3. Size: Four feet by eight feet (1,220 mm by 2,440 mm) for vertical installation.

## 2.5 SUBFLOORING AND UNDERLAYMENT

A. Plywood Combination Subfloor Underlayment - DOC PS 1, Exterior, Structural I, C-C Plugged Single Floor Panels:
   1. Span rating: Not less than 20 o.c.
   2. Nominal thickness: Not less than one inch (25 mm).
   3. Edge detail: Tongue and groove.
   4. Surface finish: Fully sanded face.

B. Underlayment: Provide underlayment in nominal thickness not less than 1/4 inch (6.4 mm) over smooth subfloors and not less than 3/8 inch (9.5 mm) over board or uneven subfloors.

C. Sound Deadening Board - Class C Fire Rated, Molded, Recycled Post-Consumer Paper, Cellulose Fiber Structural Panel:
   1. Density: 26 pcf to 28 pcf (416 = 448 kg/cu.m) tested in accordance with ASTM C209.
   2. Tensile strength - when tested in accordance with ASTM C209:
      a. Parallel: 450 - 700 psi (3,100 - 4,830 kPa).
      b. Transverse: 750 - 1--- psi (5.1171 - 6.894 kPa).
   3. Hardness (Janka Ball): 230 pounds (104 kg) tested in accordance with ASTM D1037.
   4. Water absorption by volume, when tested in accordance with ASTMC209:
      a. Two-hour immersion: Maximum seven percent (7%).
   5. Expansion: 50 percent to 90 percent relative humidity, 0.25 percent in accordance with ASTM C209.
   6. Noise reduction coefficient (NCR): 0.20.
   7. Flame spread: Maximum 75 tested in accordance with ASTM E84 Class C.
   8. Thickness: 3/4 inch (19 mm).

## 2.6 FASTENERS

A. Provide fasteners of size and type indicated that comply with requirements specified for material and manufacture. Provide fasteners with hot dip zinc coating complying with ASTM A153/A153M.

B. Nails, Brads, and Staples: ASTM F1667.

C. Power Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening Gypsum Sheathing to Cold Formed Metal Framing:
   1. Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic polymer or corrosion protective coating having salt spray resistance of more than 800 hours according to ASTM B117:
      a. For steel framing less than 0.0329 inch (0.835 mm) thick, use screws that comply with ASTM C1002.

## 2.7 SHEATHING JOINT AND PENETRATION TREATMENT MATERIALS

A. Sealant for Glass Mat Gypsum Sheathing:
   1. Silicone emulsion sealant complying with ASTM C834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass fiber sheathing tape and for covering exposed fasteners:
      a. Sheathing tape: Self-adhering glass fiber tape, minimum two inches (50 mm) wide, ten by ten or ten by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass mat gypsum sheathing and with history of successful in-service use.

## 2.8 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Framing: Formulation complying with ASTM D3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

# PART 3 EXECUTION

## 3.1 INSTALLATION

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three (3) support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated.

D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate wall and roof sheathing installation with flashing and joint sealant installation so materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

## 3.2 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions. Fasten gypsum sheathing to cold formed metal framing with screws. Install boards with a 3/8-inch (9.5 mm) gap where non-load bearing construction abuts structural elements. Install boards with a 1/4-inch (6.4 mm) gap where they abut masonry or similar materials that retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Vertical Installation:
   1. Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud:
      a. Space fasteners approximately eight inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of boards.

D. Seal sheathing joints according to sheathing manufacturer's written instructions. Apply glass fiber sheathing tape to glass mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal penetrations and openings.

**END OF SECTION 06 16 00**

# SECTION 07 52 19 MODIFIED BITUMEN "COOL ROOF" MEMBRANE ROOFING SYSTEM

## PART 1 GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Providing coordination for the entire roofing assembly, including, but not limited to:
   1. Tapered edge strips, cant strips, and wood nailers.
   2. Modified bitumen membrane roofing.
   3. Flashings, including sheet metal perimeter edge (fascia).
   4. Work incidental to, the complete and proper installation of a watertight modified bitumen membrane roofing system as shown on the drawings or specified herein, and in accordance with all applicable requirements of the Contract Documents.

B. It is the intent of this Section that the Work shall:
   1. Provide a watertight facility.
   2. Conform to all applicable building code requirements and of authorities having jurisdiction.
   3. Include Section 07 62 00, Roof Related Sheet Metal as part of the Work of this Section; and be performed to obtain a single responsibility total system warranty.

C. Work and materials hereinafter specified shall be best of kind described and, unless specified otherwise, shall be new and of best quality. All roofing materials utilized in performance of each type of work shall be the products of one (1) manufacturer or supplier.

D. Related Work:
   1. All Sections of Work related to the roofing system, including but not limited to mechanical, plumbing and electrical items penetrating the roof system.

E. Related Sections:
   1. Section 06 10 00: Rough Carpentry.
   2. Section 07 62 00: Roof Related Sheet Metal.
   3. Section 07 72 00: Roof Accessories.

F. Reference Standards:
   1. American Society for Testing and Materials (ASTM):
      a. C920, Standard Specification for Elastomeric Joint Sealants.
      b. D41, Standard Specification for Asphalt Primer Used in Roofing, Damproofing, and Waterproofing.
      c. D312, Standard Specification for Asphalt Used in Roofing.
      d. D2178, Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
      e. D4479, Standard Specification for Asphalt Roof Coatings - Asbestos-Free.
      f. D4586, Standard Specification for Asphalt Roof Cement, Asbestos-Free.
      g. D4601, Standard Specification for Asphalt-Coated Glass Fiber Sheet Used in Roofing.
      h. D5147, Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material.
      i. D6163, Standard Specification for Styrene Butadiene Styrene (SBS) Modified

Bituminous Sheet Materials Using Glass Fiber Reinforcements.
2. ASCE-7 Wind uplifts requirements for geographical area.
3. National Roofing Contractors Association (NRCA):
   a. Roofing and Waterproofing Manual. (Latest Edition)
4. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):
   a. Architectural Sheet Metal Manual. (Latest Edition)
5. 2019 California Building Code (CBC).
6. Underwriters' Laboratories (UL)
   a. Fire Hazards Classifications

## 1.3 SUBMITTALS

A. Product Data: Submit manufacturer's printed instructions, schedules, charts, literature, and illustrations of all the material required for the overall roof system. Each material literature is to indicate the performance, fabrication procedures, product variations, fastener pattern layout, and accessories to be used in the Work.

B. Provide asphalt fume recovery plan, for equipment data and proposed loading and heating procedures to limit ground level asphalt fumes.

C. Certifications:
1. Manufacturer's written certification of when the installer was approved and licensed to install specified roofing system.
2. Manufacturer's affidavit that materials used in Project contain no asbestos.
3. Installer shall submit resume and project experience list for proposed system for Project Manager and job site superintendent.
4. Installer shall submit list of all subcontractors with evidence of subcontractor's insurance coverage in compliance with contract requirements.
5. Manufacturer's written certification of approval / acceptance of these specifications and details.
6. Warranty: Submit letter from manufacturer signed by agent authorized to do so, stating acceptance of warranty as specified and detailed.

D. Referenced Standards: Two (2) copies of each referenced standard and retain approved copies at site.

E. Shop Drawings:
1. Contractor to indicate "Furnish details per Project Drawings" if no details are to differ.
2. Differing Details: Furnish for approval if contractor proposes to utilize details that differ from project documents. Submission to include but limited to:
   a. Roof layout to confirm roofing as shown on drawings.
   b. Furnish proposed details which differ from those indicated on drawings.
      1) All proposed details shall first be approved in writing by roofing manufacturers prior to submitting to Architect for approval.
   c. Furnish detail project sequencing, staging, material loading, manpower plans, and project construction schedule.

F. Samples:
1. Submit roofing material samples
2. Submit sample copy of job specific warranty that is to be issued upon project completion.
3. Submit mock-up of all fabricated sheet metal items.
4. Submit 12 inch x 12 inch sample of all types of roof membranes to be installed.

G. Temperature Charts: Bitumen heating devices 24 hour temperature charts.

H. Test Reports:
   1. Bitumen manufacturer's test reports relative to the following for each batch of bitumen furnished:
      a. Softening Point: ASTM D312.
      b. Flashpoint: ASTM D92.
      c. Acceptable Bitumen Temperature: As recommended by the bitumen manufacturer and EVT label on containers.
      d. Thermometers: Two (2) hand held, "8F" thermometers complying with ASTM E1 to Architect for his checking kettle temperature.

I. Manufacturer written reports from manufacturer representative site visit to be submitted no later than each Monday following prior weeks visit. Reports are to be issued to Architect, General Contractor, IOR and client.

J. Substantial Completion of Work:
   1. Manufacturer's Warranty: Manufacturer's written warranty as specified.
   2. Maintenance Procedures: Three (3) copies of manufacturer's printed instructions for Owner's use regarding care and maintenance of roof.

## 1.4 INSPECTIONS / TESTS

A. The IOR, Roof Consultant and Manufacturer's representative shall at all times have access to the job site and work areas. The contractor will provide proper and safe facilities for such access and inspection:
   1. Roof Consultant Inspections: The Roof Consultant will be providing periodic inspections throughout the duration of the project. Roof Consultant's Representative shall be required to inspect after completion of each major phase of roof construction for approval.
   2. Manufacturer Inspections:
      a. An inspection shall be made by a representative of the material manufacturer a minimum three (3) times monthly during performance of Work to ensure that said project is installed in accordance with the manufacturer's specifications and illustrated details. Written reports by the manufacturer shall be turned over to the Architect, General Contractor, IOR and client on each Monday following the prior week.
      b. The authorized material manufacturer's field representative shall be responsible for:
         1) Keeping the Architect's representative informed after periodic inspections as to the progress and quality of the work observed.
         2) Calling to the attention of the contractor those matters observed which are considered to be in violation of the contract requirements.
         3) Reporting to the Architect's representative, in writing, any failure or refusal of the contractor to correct unacceptable practices called to his attention.
         4) Confirming, after completion of the work and based on his observation and test, that he has observed no application procedures in conflict with these specifications.

B. Any failure by the Architect's or Manufacturer's Representative to detect, pinpoint, or object to any defect or noncompliance of these specifications of work in progress or completed work shall not relieve the contractor, or reduce, or in any way limit, his responsibility of full performance of work required of him under these specifications.

C. Architect may require tests and inspections as necessary to verify quality of roofing materials and workmanship. Laboratory tests will be performed in accordance with ASTM standard procedures (Refer to Division 01).

## 1.5 QUALITY ASSURANCE

A. Applicator:
   1. Applicator shall have approval by manufacturer of accepted roofing system for application and issuance of specified warranty for a minimum of three (3) years. Proof of license agreement dated at least three years prior to date of bid opening.
   2. Applicator shall be an experienced single firm specializing in the type of roofing and sheet metal work specified, with a minimum of five (5) years of previous successful experience on projects similar in size and scope.
   3. No subcontracting of sheet metal fabrication or installation will be accepted. Contractor must have a sheet metal shop on the company premises.
   4. Applicators shall have a competent Superintendent, who is not actually performing roofing work, on site at all time while work is in progress, with full authority to act on behalf of the Contractor as his agent.
   5. All workmen shall be covered by Workmen's Compensation insurance (verify upon request) and thoroughly experienced in the particular class of work upon which employed. Use of undocumented workers will not be tolerated - No Exceptions.
   6. Contractor shall ensure that fasteners (insulation/base sheet/etc.) pull out resistance tests on existing decks were performed and approved by Manufacture and coordinated with IOR, Architect, and Roofing Consultant prior to starting roofing application.
   7. Roofing contractor must have reached the highest level of qualifications from the manufacture they are providing material for (i.e. Master Select contractor)

B. Regulatory Requirements:
   1. All work shall conform to those requirements to meet Class A roof coverings as out outlined by Underwriters' Laboratories, Inc.
   2. Roofing system shall be installed in accordance with ASCE-7 wind uplift requirements as indicated by SEOR (if applicable) for geographical location exposure C, 115 MPH 3-second gust wind speed zone and risk category III. Wind-resistance loads listed below have a safety factor of 2.0 incorporated in the calculation.
      a. Zone 1 Field – 38.6psf
      b. Zone 2 Perimeter (Within 8'-0" of perimeter edge) – 64.6psf
      c. Zone 3 Corner (Within 8'x8' of corner edges) – 97.4psf
   3. Follow local, state, and federal regulations of safety standards and codes. Refer to California Building Code for roofing system installation requirements and limitations.

C. Laboratory Testing and Samples:
   1. Architect may require tests and inspections as necessary to verify quality of roofing materials and workmanship. Laboratory tests will be performed in accordance with ASTM procedures.
   2. Owner will select testing laboratory and will pay for Work required by testing laboratory. Contractor shall assume all costs for extraction and patch of all samples.
   3. Re-tests for work which fail: The contractor shall pay inspections and retesting.
   4. Contractor shall correct all deficiencies identified by the architect in accordance with manufacturers recommended procedures at no cost to Owner.

D. Installation:
   1. Unless otherwise indicated on the drawings, the materials to be used in this specification are those specified and denoted the type, quality, performance, etc. required. All proposals shall be based upon the use of the specified material.
   2. Install materials in accordance with Contract Documents and the manufacturer's current published application procedures and the general recommendations of the National Roofing Contractors Association.
   3. It will be the contractor's responsibility to obtain and/or verify any necessary dimensions by visiting the job site, and the contractor shall be responsible for the correctness of it. Any drawings supplied are for reference only.
   4. Contractor shall plan and conduct the operations of the work so that each section started on one day is complete, details installed and thoroughly protected and in

watertight condition before the close of work for that day.

5. Materials will be securely fastened in place in a watertight, neat and workmanlike manner. All workmen shall be thoroughly experienced in the particular class of work upon which employed. Work shall be performed in accordance with these specifications and shall meet the approval in the field of the Roof Consultant.
6. All waste materials, rubbish, etc., shall be removed from the premises as accumulated. Rubbish shall be carefully handled to reduce the spread of dust, and shall be deposited at an approved disposal site. At completion, all work areas shall be left broom clean and all contractors' equipment and materials removed from the site.

E. Pre-Installation Conference:
   1. Preinstall meeting at site.

## 1.6 WARRANTY

A. Roofing Manufacturer:
   1. Warrant the roofing and associated Work for 20 years from date of Substantial Completion as follows:
      a. The warranty shall be a No Dollar Limit (NDL) with no penal sum type, with total replacement cost.
      b. The warranty shall guarantee the entire roof system and associated work against defective materials and workmanship of installation, with NO exclusion for ponding water.
      c. The roof system shall include roof insulation, flashing, metal work, labor, and material shall be guaranteed against failure of workmanship and materials. Repair of the system, including materials and labor, shall be done at no cost to the Owner.

B. Roofing Contractor: Jointly with any subcontractors employed by him, shall guarantee the work required and performed under this contract will be free from defects in workmanship and materials, and that the building will be and remain waterproof for a five (5) year warranty period, after the Architect accepts the work as substantially complete. The warranty shall be in approved notarized written form, to obligate the Contractor, and subcontractors, to make good the requirements of the warranty. The warranty will be held jointly with the Bonding Company for the first two (2) years and the manufacturer for the remaining three (3) years.

C. Make arrangements with the materials manufacturer to provide required inspections for issuance of warranty. Final warranty shall be submitted to Owner at time of Substantial Completion.

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original unopened packaging with all tags and labels intact and legible. Carton and can labels shall indicate appropriate warnings, storage conditions, lot numbers, and usage instructions. Handle and store materials and equipment in such a manner as to avoid damage. Coordinate material storage with site owner's representative.

B. Manufacturer's packaging and/or roll plastic is not acceptable for exterior storage. Tarpaulin with grommets shall be minimum acceptable for exterior coverings. All materials stored as above shall be minimum of four (4) inches off the substrate, and the tarpaulin tied off with rope.

C. Products liable to degrade as a result of being frozen shall be maintained above 40 degrees F in heated storage.

D. Moisture sensitive products shall be maintained in dry storage areas or properly covered.

Roofing insulation and felts must always be covered or stored in a dry area when not being used.

E. The proper storage of materials is the sole responsibility of the contractor. Materials damaged in shipping or storage shall not be used. Wet or damaged roofing materials shall be discarded, removed from job site, and replaced with new materials prior to application.

F. No storage of materials shall be permitted on roof areas other than those materials that are to be installed the same day. Any exception must be in written form. Do not place materials or equipment in such a manner as to overload structure.

## PART 2 PRODUCTS

### 2.1 GENERAL

A. All materials shall be manufactured, specified, or accepted in writing by membrane manufacturer issuing the warranty.

B. All materials used on the project shall be asbestos free.

### 2.2 APPROVED PRODUCTS AND MANUFACTURERS

A. Unless noted otherwise, specifications are based on products of manufacturers listed below. Manufacturers whose products meet or exceed the specifications, who have manufactured and installed roof materials and systems of the type specified for a minimum of ten (10) years, and who maintains a single source responsibility for the total roofing system, as described herein, may apply for approval as a substitution in accordance with Division 01 requirements regarding substitutions. The following approved manufacturers:
   1. Soprema, Wadsworth, OH; (800) 356-3521.
   2. Siplast, Inc., Irving, TX; (800) 922-8800.
   3. Firestone Building Products Company, Carmel, IN (800) 428-4442.

### 2.3 ROOFING SYSTEM ASSEMBLY UNDERLAYMENT DESCRIPTION

A. **Mechanically Attached Base Sheet**: A fiberglass reinforced, Styrene-Butadiene-Styrene modified asphalt coated sheet, having an average weight of 28 pounds per square.
   1. Approved Product:
      a. Soprema Product: Modified Sopra G
      b. Siplast Product: Para Base, base sheet.
      c. Firestone Product: SBS Base, base sheet.

### 2.4 ROOF MEMBRANE ASSEMBLY/SYSTEM DESCRIPTION

A. A roof membrane assembly consisting of two (2) plies of a prefabricated, reinforced, homogeneous polymer modified asphalt membrane, secured to specified insulation or substrate. The assembly shall possess waterproofing capability, such that a phased roof application, with only the modified bitumen base ply in place, can be achieved for prolonged periods of time without detriment to the watertight integrity of the entire roof system. Contractor option to install using hot asphalt “mopped”, cold adhesive, torched, or any combination – confirm special membrane types with manufacturer. Provide components of the roof membrane assembly meeting the following physical and mechanical requirements:
   1. **Hot Asphalt Applied Modified Bitumen Base Ply**: Approximately 90mils high performance modified bitumen base ply consisting of a lightweight random fibrous glass mat impregnated and coated with high quality modified bitumen
      a. Approved Product:

1) Soprema Product: Elastophene Sanded 2.2
2) Siplast Product: Paradiene 20.
3) Firestone Product: SBS Base.

2. **Torch Applied Modified Bitumen Base Ply**: Approximately 120mils high performance modified bitumen base ply consisting of a lightweight random fibrous glass mat impregnated and coated with high quality modified bitumen
   a. Approved Product:
      1) Soprema Product: Elastophene Flam
      2) Siplast Product: Paradiene 20 TG.
      3) Firestone Product: SBS Glass Torch Base.

3. **Hot Asphalt Applied Modified Bitumen Finish Ply**: Approximately 130mils (or more) high performance modified bitumen “cool roof” reflective white granulated finish ply consisting of a lightweight random fibrous glass mat impregnated and coated with high quality modified bitumen
   a. Approved Product:
      1) Soprema Product: Elastophene LS FR GR SG
      2) Siplast Product: Paradiene 30 FR BW.
      3) Firestone Product: SBS Glass FR Ultrawhite.
4. **Torch Applied Modified Bitumen Finish Ply**: Approximately 140mils (or more) high performance modified bitumen “cool roof” reflective white granulated finish ply consisting of a lightweight random fibrous glass mat impregnated and coated with high quality modified bitumen
   a. Approved Product:
      1) Soprema Product: Elastophene Flam LS FR GR SG
      2) Siplast Product: Paradiene 30 FR TG BW.
      3) Firestone Product: SBS Glass FR Torch Ultrawhite.
5. Stripping Ply: Same as roof system base ply.

## 2.5 FLASHING MEMBRANE ASSEMBLY

A. A flashing membrane assembly consisting of two (2) plies of reinforced, polymer modified asphalt membrane with a torch or cold adhesive applied “cool roof” reflective white granulated finish for protection from ultraviolet degradation:
   1. **Hot Asphalt Applied Modified Bitumen Base Flashing Membrane**:
      a. Soprema Product: Elastophene Sanded 2.2
      b. Siplast Product: Paradiene 20.
      c. Firestone Product: SBS Base.
   2. **Torch Applied Modified Bitumen Base Flashing Membrane**:
      a. Soprema Product: Elastophene Flam
      b. Siplast Product: Paradiene 20 TG.
      c. Firestone Product: SBS Glass Torch Base.
   3. **Cold Applied Modified Bitumen Finish Flashing Membrane**:
      a. Soprema Product: Elastophene FR GR SG
      b. Siplast Product: Paradiene 30 FR BW.
      c. Firestone Product: SBS Glass FR Ultrawhite.
   4. **Torch Applied Modified Bitumen Base Flashing Membrane**:
      a. Soprema Product: Elastophene Flam FR GR SG
      b. Siplast Product: Paradiene 30 FR TG BW.
      c. Firestone Product: SBS Glass FR Torch Ultrawhite.
   5. Reinforcing PLY: Same as roof system base ply.

## 2.6 ROOFING SHEET METAL

A. Refer to Section 07 62 00, Roof Related Sheet Metal.

## 2.7 ROOF INSULATION

A. Roofing Insulation:
1. All insulation shall be approved in writing by the membrane manufacturer as to thickness, type, and manufacturer. All insulation must be approved for the specific application with UL and FM Global approval.
2. **Polyisocyanurate Roof Insulation:** Shall comply with ASTM C1289 Type II, Class 1, Grade 2 (20 psi minimum compressive strength). Insulation shall be surfaced on both sides with a non-asphaltic non-organic coated fiberglass facers. Thickness shall be a minimum 3.5" over all conditioned air space, see drawings for details.
   a. Approved product:
      1) Soprema Product: Sopra-ISO
      2) Siplast Product: Paratherm
      3) Firestone Product: ISO 95+ GL Insulation
3. **Recover Board (Option No. 1)**: Glass-Faced Gypsum Roof Board equal to UL rated Type X "Dens Deck Prime" as produced by Georgia-Pacific. Board sizes shall be 48" x 96" x 1/4" or as indicated on drawings for roof assembly. Provide as required by manufacture recommendation primer for Roof System. Approved substitute, SECUROCK by USG.
4. **Recover Board (Option No. 2)**: Semi rigid, asphaltic roofing substrate board, composed of a mineral fortified asphaltic core formed between two fiber-glass reinforcing plies as produced by Soprema. Board sizes shall be 48"x98"x1/8".
5. **Tapered Polyisocyanurate Insulation**: Shall comply with ASTM C1289 Type II, Class 1, Grade 2 (20 psi minimum compressive strength) Insulation shall be surfaced on both sides with a non-asphaltic non-organic coated fiberglass facers. Board sizes shall be 48"x48" sloped/cut to 1/4 inch per foot slope or as indicated on drawings for roof assembly.
   a. Approved product:
      1) Soprema Product: Sopra-ISO Tapered
      2) Siplast Product: Paratherm Tapered
      3) Firestone Product: ISO 95+ GL Insulation Tapered:
6. Tapered Edge Strip: 1-1/2 inches to 0 inches, 18 inches x 48 inches, install at all roof drains, expansion joints, curbs, projections, crickets, saddles and base flashings. Approved material shall be as manufactured by Cant Products or pre-approved equal.

## 2.8 ROOFING ACCESSORIES

A. Roofing Adhesives:
1. Mopping Asphalt:
   a. Asphalt that has been certified for full compliance with the requirements for Low Fume, Low OdorType IV asphalt listed in Table I, ASTM D312. Each container or bulk shipping ticket shall indicate the equiviscous temperature EVT, the finished blowing temperature, FBT, and the flash point, FP:
      1) Approved Product: Trumbull TruLo Max asphalt
      2) Or preapproved equal
2. Cold Adhesive:
   a. An asphalt based adhesive formulated especially for adhering polymer modified asphalt roofing membranes and base plies. Adhere shall be UL & FM listed and approved:
      1) Soprema Product: Colply Adhesive.
      2) Siplast Product: PA-311 Adhesive.
      3) Firestone Product: MB Cold Adhesive.

B. Bituminous Cutback Materials:
1. Primer: A high flash, quick drying, asphalt solvent blend which meets or exceeds ASTM D41 requirements.

2. Plastic Cement: An asphalt cutback mastic, reinforced with non-asbestos fibers, used as a base for setting metal flanges and conforming to ASTM D4586 Type II requirements.
3. Flashing Cement: A heavy-bodied all-weather trowel grade mastic, used as a base for laying-up cold process flashing membrane where fast setting adhesives are required.

C. Liquid Applied Penetration Flashing System:
1. Polyurethane bituminous PMMA resin with polyester fleece reinforcement specifically formulated for liquid applied flashing or roof penetrations to be utilized at following locations:
   a. Flashing drains, penetrations, protrusions, electrical penetrations, low curb details, I-beams and other similar or unconventional conditions.
   b. Approved Product/Manufacturer:
      1) Soprema Product: Alsan Flashing; Polyfleece
      2) Siplast Product: ParaPro Flashing Resin; Pro Fleece
      3) Firestone Product: UltraFlash Liquid Flashing; UltraFlash Fabric

D. Sealants:
1. A single component, high performance, elastomeric sealant conforming to ASTM D232 or ASTM C920 requirements. Acceptable types are as follows:
   c. Sonolastic NP 1 manufactured by Sonneborn Building Products; Minneapolis, MN (612) 835-3434.

E. Heat-Resistant, High-Temperature Sealant:
1. #736 Heat Resistant Sealant by Dow Corning.
2. RTV 382 by Intek Sealants & Adhesives.
3. High Temp RTV Silicon #26C by Permatex.
4. Superflex Red High Temp RTV by Loctite.
5. #1300 Rubber and Gasket Adhesive by Scotch Grip.
6. Sikasil GP HT (High Temperature) by Sika (up to 500-degrees, Long-time lead item).

F. Ceramic Granules: No. 11 Grade Specification Ceramic granules of color scheme matching the granule surfacing of the finish ply.

G. Walkpads/Protection Pads:
1. Provide cut sections of granule surfaced polyester reinforced modified bitumen sheet, such as “Sopra Walk:”
   a. Walk pads shall have contrasting granule color from surfacing.
   b. Provide walk pads shall be installed at point of roof access, at service points of all roof mounted equipment requiring periodic maintenance.
   c. Protection pads shall have rounded corners and extend minimum four (4) inches beyond edge of overlying element.
   d. Provide new protection pads under all pipe supports, at HVAC and mechanical access points, in front of all roof top doors and openings.

H. Fasteners:
1. Shall be Factory Mutual approved and as recommended by the manufacturer for the specific application.
2. Fastener for Brick/Masonry: Shall be 1/4 inch x 2 inches, stainless steel nail, one piece unit, flat head, as manufactured by Rawl Zamac Nailin, or approved equal.
3. Fastener for Wood and Insulation: Shall be a minimum #14 Factory Mutual approved fastener, fluorocarbon coated, with CR-10 coating. A minimum 0.200 inch diameter shank and 0.250 inch diameter thread. To be used with Factory Mutual approved, round pressure plates or bar, and having a fluorocarbon CR-10 coating, when subjected to 30 Kesternich cycles (DIN 50018) shows less than ten percent (10%) red rust which surpasses Factory Mutual Approval Standard 4470 as manufactured by Olympic Manufacturing Group, Inc., or pre-approved equal. Stainless Steel 304 when used with

ACQ treated lumber.

4. Nails: Stainless Steel ring shank, size as required to suite application, minimum 11 gauge with 3/8 inch diameter head.
5. Iron-Lok Toggle: Shall be a toggle bolt with minimum 0.215 inch diameter shank and minimum 20 threads per inch, with a 2-1/2 inch wing span, with wing activated adhesive and pressure plate, as manufactured by Olympic Manufacturing Group, Inc.

## 2.9 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Other materials shall be as shown, specified or required and be of the best grade for the proposed use as recommended by the manufacturer:
   1. Expansion Joint: As detailed on drawings and outlined in NRCA and SMACNA manuals.
   2. Low Level expansion joints, as noted on the drawings, to be fabricated similar to Situra Inc. “Red Line” Low level expansion joint details. Install as per manufactures recommendations:
      a. Approved Substitute Soprema’s “Sopra Joint”. Install as per manufactures recommendations.
   3. Sealant Backer Rod: Provide compressible rod stack of polyethylene foam, polyurethane foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable, non-absorptive material as recommended by sealant manufacturer for back-up of and compatibility with sealant. Where used with hot-applied sealant, provide heat-resistant type which will not be deteriorated by sealant application temperature as indicated.
   4. Pipe Hangers and Supports: Provide and install all necessary supports for gas lines, conduit, chilled water lines, duct work, condensate lines, etc. Refer to Section 07 72 00: Roof Accessories.
   5. Cant Strips: Shall be perlite where used for non-structural purposes. Shall be treated solid wood where used for structural purposes meeting NRCA, Factory Mutual and Underwriters Laboratory guidelines. If solid wood cant is used where insulation exists, cant is to be toe nailed into treated solid wood nailer the same height as insulation.
   6. Termination Bar:
      a. Material: Extruded aluminum bar with lip profile.
      b. Size: 0.090 inch thick by 3/4 inch wide with 3/16 inch lip width and a 45 degree lip angle, factory punched 1/4 inch x 3/8 inch oval holes spaced six (6) inches on center.
      c. Approved Product/Manufacturer: “LIPTB 06” manufactured by Olympic Manufacturing Group, Inc., or approved equal.

# PART 3 EXECUTION

## 3.1 PROJECT CONDITIONS

A. Weather Condition Limitations:
   1. Proceed with roofing work when existing and forecasted weather conditions permit work to be performed in accordance with manufacturer’s recommendations and warranty requirements:
      a. Roofing application with moisture present will not be accepted – Apply roofing in dry weather.
      b. Do not attempt construction of the roofing system when the reported or calculated dew point are within three (3) degrees of each other.
      c. Do not apply roofing when ambient temperature is below 45 degrees F.

B. Do not allow waste products, petroleum, grease, oil solvents, mineral oil, and other contaminants to come into contact with the roofing system before or during installation. Advise Owner if there is a possibility of his facility emitting such contaminants in the future.

## 3.2 PRECAUTIONS

A. Some of the indicated materials are extremely flammable and/or toxic. Use precautions indicated on can and/or carton labels.

B. Due caution should be exercised so as not to alter the structural integrity of the deck. When cutting through any deck, care should be taken so as not to damage the deck or any part of the deck, such as post tension cables, etc.

C. If torches are used, Contractor shall maintain a three (3) hour fire watch after completion of torching of each day's work. Provide a 20 lb. fire extinguisher near torch at all times. Use a thermal infrared thermometer to monitor all roof areas.

D. The contractor is to verify the location of all interior ducts, electrical lines, piping, conduit, and/or similar obstructions. The contractor is to perform all work in such a manner as to avoid contact with the above mentioned items.

## 3.3 ROOFING AND FLASHING - GENERAL

A. Membrane Application: Install roofing in accordance with roofing system manufacturer's current published instructions and the following requirements. Application of roofing membrane components shall immediately follow installation of insulation as a continuous operation.

B. Aesthetic Considerations: An aesthetically pleasing overall appearance of the finished roof application is a standard requirement for this Project. Make necessary preparations, utilize recommended application techniques, apply the specified materials and exercise care in ensuring that the finished application is acceptable to the Owner.

C. Application of materials shall be in strict accordance with the manufacturer's recommendations except where more stringent requirements are shown or specified. In the instance of a conflict between these specifications and those of the manufacturer, the more stringent specifications shall take precedence.

D. General Installation:
   1. Protect adjacent areas with tarpaulin or other durable materials.
   2. Contractor shall prevent overspray, and be responsible for parking lot areas and/or adjoining areas not part of this contract.
   3. Contractor shall be responsible for sealing, as required, all openings that may allow bitumen migration or drippage, i.e. pitch dams, envelopes, and filler strips.
   4. Prepare surfaces according to manufacturer's or applicator's published instructions. All metal that is to receive bitumen, or come in contact with bitumen or adhesive, shall be first primed with appropriate primer. All Kynar 500 or Hylar 5000 finished metal shall be buff sanded on the surface which is to be primed prior to the application.
   5. Use cleaning materials or primers necessary to render an acceptable surface/substrate.
   6. All surfaces/substrates shall be clean and dry prior to application of materials. Roof deck substrates shall be inspected for moisture in accordance with the manufacturer's recommendations. Architect's representative shall witness inspection. Roofing installed before inspection by Architect's representative shall be removed to allow inspection.
   7. Prior to application of felts and membrane, all foreign matter, gravel, etc., shall be removed from the substrate. Gravel or debris between the substrate and plies is not acceptable.
   8. Ambient temperature shall be 45 degrees F and rising.
   9. Bitumen kettles or tankers shall have a visible thermometer and thermostatic control to

provide positive monitoring of the bitumen temperature when it is heated in accordance with manufacturer's instructions. Kettle shall be kept a minimum of 20 feet away from building, placed so that fumes, odors, and smoke, do not enter building through windows, doors, fresh air vents or similar entrances; are not directed towards freshly painted or anodized surfaces, glass or other glazing materials. Do not place kettle under trees or near vegetation. The assigned kettle man shall remain in close attendance, within 25 feet of ground level, while burners are lit. Kettle lids are to remain closed except for loading. Level of bitumen shall be kept within eight (8) inches from top of kettle. All kettles are to have afterburners installed to reduce fume emissions.

10. Asphalt Bitumen Heating: Heat and apply bitumen in accordance with equiviscous temperature method ("EVT Method") as recommended by the manufacturer. Discard bitumen that has been held at temperature, exceeding finished blowing temperature (FBT) for a period exceeding three hours. Do NOT heat bitumen to a temperature higher than 25 degrees F (14 degrees C) below flash point:
11. Asphalt Temperatures: If the EVT information is not provided, the following asphalt temperature shall be observed. Maximum heating temperature shall be 525 degrees F. Minimum application temperature shall be 400 degrees F.
12. Asphalt Moppings: Ensure that all moppings do not exceed a maximum of 25 pounds per square. Mopping shall be total in coverage, leaving no breaks or voids.
13. Membrane Adhesive Application: Apply cold adhesive in a smooth, even, continuous layer without breaks or voids at the rate of 1-1/2 gallons per square per ply (The porosity of some substrates may require a heavier application to ensure full adhesion).
14. Bitumen Consistency: Cutting or alterations of bitumen, primer, and sealants will not be permitted.
15. Circulate bituminous materials, do not allow bituminous materials to stand in luggers for long periods. Use insulated hot transport lines and luggers.
16. Keep kettle lid closed except when adding bitumen.
17. Wrinkles, buckles, kinks, and fishmouths are not acceptable when laying felt and membrane.
18. Dry voids of felt on felt are not acceptable.
19. Primed cant strips shall be installed at the intersection of the deck and the vertical surfaces.
20. All flashings shall be mechanically top-fastened with a termination bar a minimum of six (6) inches on center at the top leading edge, and be a minimum of eight (8) inches in height above the finished membrane height.
21. On slopes greater than one (1) inch in 12 inches, refer to NRCA and/or manufacturer's guidelines for backnailing procedures and follow the more stringent guidelines for all specified materials.
22. Correct all errors in application the same work day they occur, including voids, fishmouths, dry laps or spots, wrinkles, ridges, blisters, bare spots, improper application, physical damage and all work not meeting specifications.
23. Follow manufacturer’s recommendation for application of cold adhesive due to slope requirements.

## 3.4 NAILERS

A. Wooden nailers shall be installed at perimeter edges or drip edges on outside perimeter of building in accordance with FM Global 1-49 securement requirements. All deck penetrations (soil stacks, mechanical curbs, etc.) shall receive wooden nailers stacked minimum 3/4 inch above designed deck thickness. Refer to drawings for specific details.

B. All Construction: Nailers shall be the same height as the finished height of the insulation layer (including coverboard where applicable). Nailers shall be anchored to resist a pull-out force of 175 pounds per foot. Fasteners shall be no less than two (2) per nailer, and be spaced at three (3) feet on center maximum or as required by FM Global 1-49 requirements. Provide nailers at all penetrations. Install / Raise all curbs, etc. a minimum of ten (10) inches above roof deck.

## 3.5 SUBSTRATE PREPARATION

A. Tear-off :
   1. Tear-off existing roof system down to existing wood (plywood, 2x TG, etc.) decking substrate, deck to remain. Remove all associated Flashings and abandoned equipment.
   2. Repair / Patch all existing decks as required, due to removal of equipment or deteriorated conditions with like kind material and fasteners.
   3. Sweep or vacuum all surfaces, removing all loose aggregate and foreign substances prior to commencement of roofing. Ensure dry, smooth surface with no depressions or ponding water. **Notify Architect prior to roofing any areas that may result in ponding water.**
   4. Trash Chutes: Roofing materials and other discarded materials shall be put into an enclosed trash chute. No material may be thrown off roof. Remove debris daily from roof and from grounds.
   5. Refer to phasing plans for flashing of existing curbs now and demolition of existing curbs and penetrations at future dates, flashing of new curbs and penetrations at a future date.

B. Substrate Surface: Prepare substrate surfaces to insure proper and adequate installation, in strict accordance with the Contract Documents and approved Shop Drawings, or manufacturer's requirements.

C. Fill all gaps and voids between substrate components that are wider than 1/4 inch. Fill all gaps with same materials as the substrate.

D. The membrane manufacturer shall specify types of substrates that are suitable for use with the bonding adhesive.

E. Protection of Adjacent Areas or Surfaces: Protect adjacent areas or surfaces from damage as a result of the Work of this section. Remove sharp projections.

F. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

G. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of the roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

## 3.6 APPLICATION OF BASE SHEET

A. Wood deck shall be covered with a base sheet, mechanically fastened as follows:
   1. Install in accordance with manufacturer's current published application instructions and to meet ASCE-7 wind uplift requirements. Fasteners and fastening patterns shall be determined by building height, pull out values from lightweight insulating concrete decks (more stringent applies), location and geographical area of the United States. It is the installer's responsibility to consult current ASCE-7 publications, literature, and bulletins that are in effect at the time of this project. Submit perimeter, field and corner fastening patterns and cite all ASCE-7 data pertaining to the fastening pattern to the Architect for review.

## 3.7 APPLICATION OF INSULATION AND COVER BOARD

A. General:
   1. In regard to attachment, the manufacturer’s instructions through the submittals shall determine the suitability for an applications (which shall meet the pressure requirements listed herein the specifications.)

2. Precautions: The surface of the insulation must not be ruptured or damaged prior to installation of the roof membrane. Replace damaged boards.
3. Thermal insulation boards shall be laid on the substrate in parallel rows with end joints staggered and butted as close as possible. All joints shall be tight and at the roof perimeter and roof penetrations, insulation shall be cut neatly and fitted to reduce openings to a minimum. All openings 1/4 inch or larger shall be filled with insulation.
4. Insulation shall be tapered or feathered at drains, gutter edge, and scuppers to provide proper drainage.
5. No more insulation shall be installed than can be covered by the completed roof system by the end of the day or the onset of inclement weather.
6. Tapered insulation and crickets, shall be placed in accordance with the drawings including tapered edge strip to ensure no void between layers of insulation and cover board.

B. Wood decks; Specified first layer of rigid insulation shall be mechanically fastened to the wood deck meeting ASCE-7 wind uplift requirements as dictated by wind zone applicable to location of project. It is the contractor's responsibility to consult current publications, literature, and bulletins of current codes and the manufacturer that are in effect at the time of this project.

C. Steel decks; Specified first layer of rigid insulation shall be mechanically fastened to the wood deck meeting ASCE-7 wind uplift requirements as dictated by wind zone applicable to location of project. It is the contractor's responsibility to consult current publications, literature, and bulletins of current codes and the manufacturer that are in effect at the time of this project.

D. For subsequent layer or layers of insulation or specified recovery board, the top surface of the underlying layer of insulation shall be adhered with SPF adhesive insulation adhesive with 2.5” wide ribbons at 12” o.c, in field and 6” o.c. in the perimeters (8’-0” from perimeter edge) and 4” o.c. at corners (8’-0”x8’-0” from corner). Once applied immediately place insulation into the wet adhesive and do not allow adhesive to skin over. Maintain constant pressure/weight on the boards while adhesive cures, usually in minutes but may vary depending on environmental conditions. Subsequent layers of insulation shall be applied using offset joints, so that all individual insulation layers joints are offset a minimum of twelve inches (12") both ways with the preceding layer, and immediately walked in place.

## 3.8 ROOF MEMBRANE INSTALLATION

A. Membrane Application: Install roofing in accordance with roofing system manufacturer's current published instructions and the following requirements. Application of roofing membrane components shall immediately follow application of insulation as a continuous operation.

B. Aesthetic Considerations: An aesthetically pleasing overall appearance of the finished roof application is a standard requirement for this Project. Make necessary preparations, utilize recommended application techniques, apply the specified materials (i.e. granules, metallic powder, etc.) and exercise care in ensuring that the finished application is acceptable to the Owner.

C. Adhesive Application: Apply cold adhesive with a spray equipment or squeegee in a smooth even, continuous layer without breaks or voids at the rate of 1 ½ to 2 gallons per square per ply (The porosity of some substrates may require a heavier application to ensure full adhesion. Refer to manufacturer’s requirements).

D. Bitumen Consistency: Cutting or alterations of bitumen, primer, and sealants will not be permitted.

E. Roofing Application:
   1. Apply all layers of roofing free of wrinkles, creases or fishmouths. Exert sufficient pressure on the roll during application to ensure prevention of air pockets. Lap seams between the base ply layer and the finish ply layer shall not coincide. Stagger the courses to ensure this:
      a. Apply all layers of roofing so that water flows over or along lap seams, but never against laps.
      b. Attach the base ply to the insulation/coverboard with cold adhesive, torch or hot asphalt. Each sheet shall have minimum three (3) inch side laps and six (6) inch end laps. Each sheet shall be applied directly behind the adhesive applicator. Stagger end laps a minimum of three (3) feet.
      c. Fully bond the finish ply to the base ply with cold adhesive, torch, or hot asphalt. Each sheet shall have a minimum of three (3) inch side and six (6) end laps. Each sheet shall be applied directly behind the adhesive applicator. Stagger end laps of the finish ply a minimum of three (3) feet. Stagger side laps of the finish ply a minimum of 12 inches from side laps in the underlying base ply. Stagger end laps of the finish ply a minimum of three (3) feet from end laps in the underlying base ply.
      d. Maximum sheet lengths and special fastening of the specified roof membrane system may be required at various slope increments where the roof deck slope exceeds 1/2 inch per foot. The manufacturer shall provide acceptable sheet lengths and the required fastening schedule for all roofing sheet applications to applicable roof slopes.
      e. Lap Treatment: A 20-pound roller shall be used on all side and end laps, following immediately behind application, apply uniform pressure across lap area to achieve a continuous visible bleed out.

F. Granule Embedment: Broadcast mineral granules over all bitumen overruns on the finish ply surface, while the bitumen is still hot, to ensure a monolithic color and adhesion.

## 3.9 ROOF FLASHING MEMBRANE INSTALLATION

A. Flashing - General:
   1. Flashings shall be installed using the manufacturer's flashing membrane, strapping vertical substrate with length of run not to exceed manufacturer's recommendations.
   2. Wooden nailers or curbs shall be installed at all edges and openings in the roof, mechanically fastened to the deck. The nailers should be of exterior grade wolmanized timber, and of the same thickness as any insulation to be used on the roof.
   3. Cant strips shall be installed/adhered at the intersection of the deck and/or all vertical surfaces. Prime all cants.
   4. The roofing field base ply membrane shall extend up over and to the top of cant strips at all vertical intersections or out to the roof's edge.
   5. All substrates receiving flashing membrane shall be clean and primed with asphalt primer, prior to application.
   6. All flashings shall be mechanically fastened with a termination bar a maximum of six (6) inches on center, be a minimum of eight (8) inches above finished roof height (seal top with three (3) coursing), extend a minimum of nine (9) inches onto the field of horizontal roof membrane, and not exceed three (3) linear feet of run in length.
   7. Install flashing membrane in accordance with drawings and/or material manufacturer's guarantee requirements, whichever is the most stringent.
   8. Exert sufficient pressure on the flashing membrane to ensure the prevention of air pockets. This can be accomplished by using a damp, kitchen type sponge mop or a damp, heavy duty cotton nap paint roller.
   9. Embed granules at all end laps of the flashing membrane with a ensure uniform coating of asphalt to overlapping of adjoining sheets.
   10. Probe laps using a clean, heated roofing trowel and heat fuse dry laps of the flashing membrane to ensure a complete seal.

B. Flashing Application - Masonry Surfaces: Flash masonry parapet walls and curbs using the using the reinforcing sheet and the “cool roof” granulated flashing membrane. After the base ply has been applied to the top of the cant, fully adhere the reinforcing sheet, utilizing minimum three (3) inch side laps and extend a minimum of three (3) inches onto the base ply surface and three (3) inches up the parapet wall above the cant. After the final roofing ply has been applied to the top of the cant, prepare the surface area that is to receive flashing coverage by torch heating granular surfaces and embed granules. Torch apply the “cool roof” granulated flashing into place using three (3) foot widths (cut off the end of roll) always lapping the factory selvage edge. Stagger the laps of the “cool roof” granulated flashing layer from lap seams in the reinforcing layer. Extend the flashing sheet a minimum of four (4) inches beyond the toe of the cant onto the prepared surface of the finished roof and up the wall to the desired flashing height. Exert pressure on the flashing sheet during application to ensure complete contact with the wall/roof surfaces, preventing air pockets; this can be accomplished by using a damp sponge or shop rag. Check and seal all loose laps and edges. Nail the top edge of the flashing on nine (9) inch centers. (See manufacturer's schematic for visual interpretation.)

C. Flashing Application - Wood Surfaces: Flash wood or plywood parapet walls and curbs using the reinforcing sheet and “cool roof” granulated flashing membrane. The reinforcing sheet shall have minimum three (3) inch side laps and extend a minimum of three (3) inches onto the base ply surface and to the top of the parapet wall, curb, etc. Nail the reinforcing sheet through the field of the sheet to the vertical wood surface on 12 inch centers from the top of the cant to top of wall curb, etc. Fully adhere the remainder of flashing reinforcing sheet that extends over the cant and roof level. After the finish ply has been applied to the top of the cant, prepare the surface area that is to receive flashing coverage by torch heating granular surfaces. Torch apply the “cool roof” granulated flashing into place using three (3) foot widths (cut off the end of roll) always lapping the factory selvage edge. Extend the flashing sheet a minimum of four (4) inches beyond the toe of the cant onto the prepared surface of the finished roof and up the wall to the desired flashing height. Exert pressure on the flashing sheet during application to ensure complete contact with the wall/roof surfaces, preventing air pockets; this can be accomplished by using a damp sponge or shop rag. Check and seal all loose laps and edges. Nail the top edge of the flashing on nine (9) inch centers. (See manufacturer's schematic for visual interpretation.)

D. Projection Flashings:
1. Plumbing Vents: Soil vent stack pipes shall receive liquid applied penetration flashing system installed in accordance with practices set forth in the NRCA Roofing Manual and outlined per the following requirements:
    a. Precut fleece for wrapping pipe, ensure the fleece extends 4” up the pipe and the fingers extend a minimum of 2” onto the field. The fingers of the fleece should be approximately 1-2” wide. Ensure when wrapping the pipe, the fleece overlaps 1”.
    b. Precut fleece for field, ensure the fleece extends 8” from the pipe in all directions. Using two pieces of fleece with overlap of 2” and cut out an opening for the pipe allowing a “snug” fit.
    c. Dry fit all of the fleece for proper fit. Tape off 1” past the fleece in the field and on the pipe for clean application. Label fleece pieces (1,2,3) and mark on tape to ensure proper order of placement.
    d. Buff sand penetration to create a rough surface.
    e. Stir liquid flashing to ensure no separation.
    f. Apply liquid flashing to the penetration at a rate of 2 gallons per square, ensuring there is no drips, dry spots and that the coverage is uniform.
    g. Apply fleece to wet liquid flashing using the brush to ensure fingers spread correctly and lay flat. Apply liquid flashing in fleece 1” overlap to ensure fleece remains in place then apply liquid flashing to fleece on pipe and onto fingers. Apply in the direction of the fleece wrap to prevent voids, fish mouths, and/or creases in the fleece.
    h. Apply liquid flashing to 1/2 of the field area at a rate of 2 gallons per square, look for similar coverage as the first application to the pipe and no dry spots.

i. Apply fleece into wet liquid flashing. Do not apply full coating on top just ensure it is set in place with light pressure.
j. Apply liquid flashing to the other 1/2 of the field area and in the area that will be overlapped by the second piece of field fleece.
k. Apply fleece into wet liquid flashing and coat the full field area with liquid flashing at a rate of 2 gallons per square. Ensure that the fleece is completely saturated and there are no voids or dry areas.
l. Remove tape around penetration and field and let dry 24 to 48 hours (curing time may vary with temperature and humidity)
m. Apply second coat of liquid flashing to pipe and field after first coat cures approximately 1-1/2" past the previous application at a rate of 2 gallons per square.
n. Broadcast granules into liquid flashing until refusal. Wait for coat to dry and then brush off remaining granules.

2. Square Projections: shall receive liquid applied penetration flashing system installed in accordance with practices set forth in the NRCA Roofing Manual and outlined per the following requirements: Cricket up-side slope.
a. Precut fleece for wrapping pipe, ensure the fleece extends 4" up the pipe and the fingers extend a minimum of 2" onto the field. The fingers of the fleece should be approximately 1-2" wide. Ensure when wrapping the pipe, the fleece overlaps 1".
b. Precut fleece for field, ensure the fleece extends 8" from the pipe in all directions. Using two pieces of fleece with overlap of 2" and cut out an opening for the pipe allowing a "snug" fit.
c. Dry fit all of the fleece for proper fit. Tape off 1" past the fleece in the field and on the pipe for clean application. Label fleece pieces (1,2,3) and mark on tape to ensure proper order of placement.
d. Buff sand penetration to create a rough surface.
e. Stir liquid flashing to ensure no separation.
f. Apply liquid flashing to the penetration at a rate of 2 gallons per square, ensuring there is no drips, dry spots and that the coverage is uniform.
g. Apply fleece to wet liquid flashing using the brush to ensure fingers spread correctly and lay flat. Apply liquid flashing in fleece 1" overlap to ensure fleece remains in place then apply liquid flashing to fleece on pipe and onto fingers. Apply in the direction of the fleece wrap to prevent voids, fish mouths, and/or creases in the fleece.
h. Apply liquid flashing to 1/2 of the field area at a rate of 2 gallons per square, look for similar coverage as the first application to the pipe and no dry spots.
i. Apply fleece into wet liquid flashing. Do not apply full coating on top just ensure it is set in place with light pressure.
j. Apply liquid flashing to the other 1/2 of the field area and in the area that will be overlapped by the second piece of field fleece.
k. Apply fleece into wet liquid flashing and coat the full field area with liquid flashing at a rate of 2 gallons per square. Ensure that the fleece is completely saturated and there are no voids or dry areas.
l. Remove tape around penetration and field and let dry 24 to 48 hours (curing time may vary with temperature and humidity)
m. Apply second coat of liquid flashing to pipe and field after first coat cures approximately 1-1/2" past the previous application at a rate of 2 gallons per square.
n. Broadcast granules into liquid flashing until refusal. Wait for coat to dry and then brush off remaining granules.

3. Prime all flanges prior to setting in a bed of mastic. Install to manufacturer's specifications. Provide tapered edge strips around base as required. Cricket up-side slope.
4. Round Projections: Strip in all flanges on round projections with specified stripping ply and cap with finish ply. Provide flashing membrane target.
5. Prime all metal prior to setting in mastic. Install to manufacturer's specifications.

E. Wall and Curb Flashings:
1. The flashing substrate shall be free of all dirt and loose material.

2. ¾" plywood is to be used at all parapets that receive wall flashings.
3. The underlayment ply or plies shall be brought to the top of the cant strip and adhered.
4. Starting on the roof at least six (6) inches from the roofside edge of the cant strip, adhere two (2) plies of flashing extending over the cant and up the vertical a minimum of eight (8) inches. Each lap of the ply sheet shall be a minimum of three (3) inches.
5. Starting two (2) inches past the flashing plies, install one (1) ply of SBS flashing membrane in hot asphalt. Laps shall not coincide with previously installed plies. The top of the SBS flashing shall be one (1) inch past the previously installed plies above the cant strip.
6. Fasten the top edge of the flashings on six (6) inch centers using approved termination bar and fasteners.
7. An NRCA-approved metal counterflashing shall extend down over the flashing a minimum of four (4) inches.
8. Cricket the drainage plane at all curb projections.

F. Bleed out of flashing membrane: Broadcast mineral granules over all bitumen overruns on the finish ply surface, while the bitumen is still hot, to ensure a monolithic color and adhesion.

## 3.10 OVERNIGHT SEAL / WATER CUT-OFF

A. Over Night Seal: Shall be performed according to accepted roofing practice as outlined in the NRCA Roofing Manual.

B. Water Cut-Off: At the end of day's work or when precipitation is imminent, construct a water cut-off at all open edges. Cut-offs can be built using asphalt or plastic cement and roofing felts, constructed to withstand protracted periods of service. Cut-offs must be completely removed prior to resumption of roofing.

## 3.11 ROOF SYSTEM INTERFACE WITH RELATED COMPONENTS

A. The following is a list of descriptions for correct installation of components integrated into the roof membrane assembly. In all cases, unless otherwise approved, incorporate flanged components into the system between the applications of the base ply and finish ply. The flange must be primed with a uniform coating of approved ASTM D41 asphalt primer and allowed to dry thoroughly; all flanges must be set in approved mastic.

B. Sealant: Caulk all exposed finish ply edges at gravel stops, waste stacks, pitch pans, vent stacks, etc., with a smooth continuous bead of approved sealant.

C. Sheet Metal: Refer to Section 07 62 00, ROOF RELATED SHEET METAL

## 3.12 FIELD QUALITY CONTROL AND INSPECTIONS

A. Roof cuts shall be performed and repaired at contractor's expense. Cuts shall be made in the areas as indicated by the Architect's representative. Send required roof cuts to roof membrane manufacturer for laboratory examination. Roof cuts required by the Architect's representative shall be furnished to the Architect's representative for testing.

B. Remove not more than one (1) 12 inch x 12 inch cut per 5,000 square feet of roof area or fraction thereof.

C. Field audit will follow criteria outlined in current roof membrane manufacturer's Reference Manual.

D. Repair sampled areas with "feathered in" patch consisting of same number of plies as in the roof

specification.

E. Correct deficiencies in roof as prescribed in current roof membrane manufacturer's Reference Manual and as approved by Architect's Representative.

## 3.13 CLEANING AND PROTECTION

A. Contractor shall keep the job clean and free from all loose materials and foreign matter. Contractor shall take necessary precautions to keep outside walls clean and shall allow no roofing materials to remain on the outside walls.

B. Leave all areas around job site free of trash, debris, roofing materials, equipment, and related items after completion of job.

C. All bituminous or roofing related materials shall be removed from ladders, stairs, railings, and similar parts of the building.

D. Remove bitumen stains from walls, walkways, and driveways.

**END OF SECTION 07 52 19**

## SECTION 07 62 00 - ROOF RELATED SHEET METAL

## PART I - 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.

### 1.1 SECTION INCLUDES

A. It is the intent of this Section that the Work shall:
   1. Conform to all applicable building code requirements and of authorities having jurisdiction;
   2. Include all shop and field formed sheet metal work shown on drawings, specified or required, including, but not limited to:
      a. Roof penetration sleeves and hood and umbrella counterflashing
      b. Metal counterflashing
      c. Expansion joint
      d. Roof drains
      e. Scuppers
      f. Metal perimeter edge
      g. Gutters, Downspouts, Splash Blocks and Splash Pans
      h. One-way roof moisture relief vents
      i. Metal gravity vents
      j. Metal heat exhaust vents
      k. Sanitary vent pipes
      l. Pipe box
      m. Copings, trim and miscellaneous sheet metal accessories.
   3. be part of the Work of Section 07 52 50, Modified Bitumen Membrane Roofing System; and be performed by a single source contractor.

B. Related Sections:
   1. Section 07 52 19; Modified Bitumen Membrane Roofing System.
   2. Section 07 72 00; Roof Accessories.
   3. All Sections of Work relating to or affecting the roofing system, including mechanical, plumbing and electrical items.

### 1.2 REFERENCES

A. ASTM International (ASTM)
   1. A525, Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
   2. A526, Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality
   3. A527, Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality
   4. A167, Standard Specification for Galvanized and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
   5. B32, Standard Specification for Solder Metal
   6. C1107, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

B. FM Global (FM)
   1. Loss Prevention Data Sheets: I-49, Perimeter Flashing

C. National Association of Architectural Metal Manufacturers (NAAMM)

D. National Roofing Contractors Association (NRCA)
1. Roofing and Waterproofing Manual – Latest Edition

E. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
1. Architectural Sheet Metal Manual – Latest Edition

F. ANSI / SPRI ES-1: Fabricate and install sheet metal edge flashings and copings to comply with requirements of ANSI / SPRI ES-1 for 115 MPH wind speed zone and wind resistance loads.

## 1.3 SUBMITTALS

A. Product Data:
1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
2. Manufacturer's installation instructions.

B. Shop Drawings: Indicating sizes, configurations, details of attachment to related and adjacent work, materials, and finishes.

C. Samples:
1. Full range of finish colors for Architect's selection.
2. 12 inch long sample of each specified item with approved finish.
3. Provide full size mockup of all shop built assemblies.

## 1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Fabricator and installer of roof-related flashing and accessories shall be the same as the membrane roof installer.

B. Comply with governing codes and regulations of authorities having jurisdiction.

## 1.5 INSTALLATION CONFERENCE

A. Installation conference to be conducted on site.

## 1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver, handle and store materials in accordance with manufacturer's instructions.

B. Handle and store materials and equipment in such a manner as to avoid damage.

C. No storage of materials shall be permitted on roof areas other than those materials that are to be installed the same day. Any exception must be in written form. Do not place materials or equipment in such a manner as to overload structure.

## 1.7 WARRANTIES

A. Manufacturer's Product Warranty:
1. Manufacturer's standard 20 year Kynar 500 or Hylar 5000 Finish warranty signed by the manufacturer, with guarantee covering any failure of the fluoropolymer finish during the warranty period.
2. Failure is defined to include, but not be limited to:

a. Deterioration of finish, such as fading, discoloring, peeling, cracking, corroding, etc.

3. Correction may include repair or replacement of failed product.

B. Roofing Contractor's Warranty:

1. Contractor shall warrant the sheet metal work and related work to be free from defects in workmanship and materials, and that the metal flashings will be and remain watertight, for a period of five (5) years from date of Substantial Completion.
2. Defects shall include, but not be limited to:
   a. Leaking water or bitumen within building or construction.
   b. Becoming loose from substrate.
   c. Loose or missing parts.
   d. Finish failure as defined above.

## PART 2 PRODUCTS

### 2.1 APPROVED MANUFACTURERS

A. Manufacturers named within specification are approved for use on the Project providing:

1. their products meet or exceed the specifications;
2. company has a minimum of five (5) years experience manufacturing products of the type specified;
3. products have been tested in conjunction with roofing membrane system as an assembly and as such has obtained the same approval and rating as the roofing membrane system; and
4. products are approved for use by the roofing membrane manufacturer.

B. Substitutions shall be in accordance with Division 1 requirements regarding substitutions.

### 2.2 SHEET METAL MATERIALS

A. General Requirements: Roofing sheet metal system shall have been tested in conjunction with roofing membrane system as an assembly and have the same approval and rating as the roofing membrane system.

B. Prefinished Galvanized Sheet Steel:

1. Commercial quality ASTM A527 G-90 hot-dip galvanized coating designation.
2. Thickness: Except as otherwise indicated, minimum 24 gauge. SMACNA recommendations shall govern.
3. Finish: Kynar 500 or Hylar 5000 in color as selected by Architect from manufacturer's full range of colors.

C. Sheet Lead:

1. Comply with FS QQ-L-201, Grade B
   a. Four (4) pound minimum for use at roof drains and soil stacks.

D. Galvanized Steel: ASTM A527 with G-90 hot-dip galvanized coating designation. Minimum thickness 24 gauge, except as otherwise noted.

E. Stainless Steel: ASTM A167, Type 302/304 Soft Temper, No. 2D finish. Minimum thickness 24 gauge, except as otherwise noted.

## 2.3 FASTENERS

A. Same metal as flashing/sheet metal or other non-corrosive metal or as noted below.

B. Exposed fasteners shall be self-sealing and gasketed for weathertight installation. (ZAC type)

C. Match finish of exposed heads with material being fastened.

D. Mechanical Fasteners:
   1. Nails: Ring shank, minimum 1-1/2 inches in length with 1/2 inch diameter head.
   2. Washers: Steel washers with bonded rubber sealing gasket.
   3. Screws: Self-tapping/Self-piercing sheet metal type of galvanized steel or compatible with material being fastened, with integral EPDM washers.
   4. Rivets: Stainless steel and cadmium plated material, closed end type of sizes recommended by sheet metal manufacturer to suit application.

E. Clips:
   1. Continuous Cleat (coping/fascia): Minimum 22 gauge, G-90 galvanized finish or galvanized steel. Match material of coping/fascia and provide one (1) gauge heavier.

## 2.4 RELATED MATERIALS

A. Solder: ASTM B32, alloy grade 58, 50 percent tin, 50 percent lead.

B. Flux:
   1. Phosphoric acid type, manufacturer's standard.
      a. For Use with Steel or Copper: Rosin flux
      b. For Use with Galvanized Steel: Acid-chloride type flux, except use rosin flux over tinned surfaces.

C. High-Temperature Sheet 40 mil thick SBS modified bituminous product of self-adhering type with polyethylene-film surface conforming to "Lastobond Shield HT" manufactured by Soprema, Inc., or approved equal.

D. Adhesives: Type recommended by flashing sheet manufacturer seaming and adhesive application of flashing sheet to ensure adhesion and watertightness.

E. Metal Accessories: Sheet metal clips, straps, anchoring devices, clamps and similar accessories required for the complete installation of work, matching or compatible with material being installed, non-corrosive, size and gauge recommended by installer to suit application and performance.

F. Sealant:
   1. Type A:
      a. Type: One-part, non-sag, moisture-curing polyurethane sealant.
      b. Approved Products/Manufacturers:
         1. "Chem-Calk 900" manufactured by Bostik Construction Products Division,
         2. "Vulkem 921" manufactured by Mameco International, Inc.,
         3. "Dynatrol I" manufactured by Pecora Corporation,
         4. "NP 1" manufactured by Sonneborn Building Products, or
         5. Approved equal.
   2. Type B:

a. Type: One-part, neutral-curing, medium-modulus silicone sealant for sealing metal to metal surfaces, i.e. metal edge, cover plates, etc.
b. Approved Products/Manufacturers:
1. “Chem-Calk 1200” manufactured by Bostik Construction Products Division,
2. “795 Silicone Building Sealant” manufactured by Dow Corning Corporation,
3. “895 Silicone” manufactured by Pecora Corporation,
4. “Omniseal” manufactured by Sonneborn Building Products,
5. “Spectrem 2” manufactured by Tremco Incorporated, or
6. Approved equal.

G. Liquid Applied Penetration Flashing System:
1. Polyurethane bituminous PMMA resin with polyester fleece reinforcement specifically formulated for liquid applied flashing or roof penetrations to be utilized at following locations:
a. Flashing drains, penetrations, protrusions, electrical penetrations, low curb details, I-beams and other similar or unconventional conditions.
b. Approved Product/Manufacturer:
1. Soprema Product: Alsan Flashing; Polyfleece
2. Siplast Product: ParaPro Flashing Resin; Pro Fleece
3. Firestone Product: UltraFlash Liquid Flashing; UltraFlash Fabric

H. Termination Bar:
1. Material: Extruded aluminum bar with flat profile.
2. Size: 1/8 inch thick by one (1) inch wide with factory punched 1/4 inch x 3/8 inch oval holes spaced six (6) inches on center.
3. Approved Product/Manufacturer: “TB 125” manufactured by TruFast Corp., or approved equal.

I. Pipe Hangers and Supports: Refer to Section 07 72 00, Roof Accessories.

J. Splash Blocks: Concrete type, of size and profiles indicated; minimum 3,000 psi compressive strength at 28 days, with minimum five (5) percent air entrainment. Use at locations where roof drainage dumps on ground.

K. Splash Pans: 22 gauge galvanized steel, of size and profiles indicated. Use at locations where roof drainage discharges over adjoining, lower roof level(s).

## 2.5 FABRICATION

A. Except as otherwise indicated, fabricate work in accordance with SMACNA Architectural Sheet Metal Manual and other recognized industry practices and reviewed shop drawings. Form all flashings, receivers and counterflashings in accordance with standards set forth in the NRCA roofing manual *and* SMACNA.

B. Comply with manufacturer's installation instructions and recommendations.

C. Unless noted otherwise, fabricate perimeter edge/fascia, scuppers, gutters, downspouts, copings, and trim from pre-finished galvanized sheet.

D. Shop fabricate work to greatest extent possible. Fabricate inside and outside corners for metal edges, counterflashing, and coping caps of equal length – minimum 2 foot lengths

E. Fabricate items to size and dimensions as indicated on the drawings. Limit single-piece lengths to ten (10) feet.

F. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work sufficient to permanently prevent leakage, damage or deterioration of the work.

G. Integrate flashing in a manner consistent with detailing. Form work to fit substrates.

H. Make angle bends and folds for interlocking metal with full regard for expansion and contraction to avoid buckling or fullness in metal after installation.

I. Fabricate items with straight lines, sharp angles, smooth curves, and true levels. Avoid tool marks, buckling, and oil canning.

J. Fold back edges on concealed side of exposed edge to form hem.

K. Unless noted otherwise, lap joints minimum one (1) inch. Rivet and solder joints on parts that are to be permanently and rigidly assembled.

L. Seams:
1. Wherever possible, fabricate non-moving seams in sheet metal with flat-lock seams and end joints.
2. Pre-finished Galvanized Steel: Seal pre-finished metal seams with rivets and silicone sealant.
3. Metal Other than Aluminum: Tin edges to be seamed, form seams, and solder.

M. On Kynar 500 or Hylar 5000 pre-finished metal, surface sand metal flanges prior to applying any primers. Prime all metal in contact with bituminous material.

N. Backpaint all concealed metal surfaces with bituminous paint where expected to be in contact with cementitious materials or dissimilar metals.

O. Expansion Provisions: Where lapped or bayonet type expansion provisions in work cannot be used or would not be sufficiently waterproof or weatherproof, form expansion joints of intermeshing hooked flanges, not less than one (1) inch deep filled with mastic sealant concealed within joints.

## 2.6 FABRICATED ITEMS

A. Metal Flashings: (Minimum ten (10') foot lengths)
1. Through wall Receiver Tray: Minimum 24 gauge stainless steel, through wall receivers shall not extend past the face of the exterior veneer more than ¾".
2. Counterflashing: Minimum 24 gauge pre-finished galvanized metal.

B. Wind Clips: Minimum 24 gauge to match material of counterflashing, one (1) inch wide by length to engage counterflashing a minimum of 1/2 inch.

C. Metal Edge:
1. Minimum 24 gauge pre-finished galvanized metal formed in maximum ten (10) foot lengths, with six (6) inch wide cover plates of same profile, four (4) inch flange, maximum seven (7) inch fascia, including a 3/4 inch gravel stop. For fascias over (7) inches a two (2) piece fascia with separate cleat will be required.
2. Provide expansion slip joints at maximum 20 feet on center.

3. Shop fabricate all interior and exterior corners. Fabricate exterior corners with 18 inch minimum to four (4) foot maximum legs. Lap, rivet, and seal prior to delivery to jobsite.
4. Fabricate to sizes and dimensions as indicated on drawings with a minimum one (1) inch coverage past top of wall. Refer to SMACNA Fig. 2-5A.
5. Provide mock-up for Architect's approval prior to fabrication.

D. Continuous Cleats: Continuous strips, same material and profile, minimum one gauge heavier of item which cleats attach.

E. Vent Hoods, Sleeves, Penetration Flashings, and Accessories: Minimum 24 gauge stainless steel, or as shown or directed otherwise.

F. Angle Termination Bar: One (1) inch x one (1) inch 24 gauge galvanized steel.

G. Roof Drain Flashing: Four (4) pound lead, minimum 36 inches by 36 inches.

H. Coping:
1. 24 gauge pre-finished galvanized metal, with six (6) inch wide cover plates of same profile.
2. Fabricate as outlined in SMACNA; Refer to Figure 3-4 A.
3. Provide tapered substrate to slope to one (1) side, and cover with waterproof membrane.
4. Install with continuous cleat one (1) side and fasten other side.

I. Gutters, Downspouts and Collector Heads:
1. Gutters and Downspouts:
   a. 24 gauge pre-finished galvanized metal formed in maximum ten (10) foot lengths, with six (6) inch wide cover plates.
   b. Minimum five (5) inch x six (6) inch box gutter (verify size meets rainfall data per SMACNA).
2. Gutter/Downspout Straps:
   a. Minimum 24 gauge pre-finished (match color of gutter) galvanized metal. Hem both sides.
3. Gutter Supports:
   a. 24 gauge pre-finished galvanized steel. Hemmed around 1/8 inch galvanized bent steel bracket.
4. Gutter Screen:
   a. Galvanized steel ¼" diamond wire screen enclosed in a pre-finished steel frame.
5. Collector Head:
   a. 24 gauge pre-finished galvanized metal.
   b. As outlined in SMACNA;
   c. Refer to Figure 1-25F and Figure 1-28 with alternate Section A-A.
6. Base Metal:
   a. Steel conforming to:
      1. ASTM A924/A792 (Formerly ASTM A792) minimum yield 40,000 psi
      2. [For primers thicker than 0. 5 mil] Steel conforming to ASTM A65 3 (formerly ASTM A446), G-90 Galvanized, minimum yield 43,500 psi
      3. 24 gauge.

J. Pipe Box Cover: 24 ga. stainless steel.

K. Heat Exhaust Curbs and Hoods: 22 gauge stainless steel.

L. Expansion Joint Cover: Minimum 24 ga. galvanized metal (Provide pre-finished metal at perimeter edge end termination.)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Verify substrates are smooth and clean to extent required to perform sheet metal work.

B. Verify roof openings, curbs, pipes, sleeves, ducts or vents through roof are solidly set in place.

C. Verify that reglets, nailers, cants, and blocking to receive sheet metal are in place and free of concrete and soil.

D. Do not start work until conditions are satisfactory.

### 3.2 PREPARATION

A. Field measure site conditions prior to fabrication work.

B. Install starter and edge strips and cleats before starting installation.

### 3.3 INSTALLATION

A. Install sheet metal with lines, arises, and angles sharp and true, and plane surfaces free from objectionable wave, warp, or buckle. Exposed edges of sheet metal shall be folded back to form 1/4 inch hem on concealed side from view. Finished work shall be free from water retention and leakage under all weather conditions. Pre-fabricated corners or transitions are required at changes in direction, elevation, or plane and at intersections. Locate field joints not less than 12 inches, nor more than three (3) feet from actual corner. Laps shall be one (1) inch, riveted and soldered at following locations:
1. Pre-fabricated corners;
2. transitions;
3. changes in direction, elevation, and plane; and
4. at intersections.

B. Anchor units of work securely in place to prevent damage or distortion from wind or buckling. Provide for thermal expansion of metal units; conceal fasteners wherever possible; and set units true to line and level as indicated. Install work with laps, joints, and seams which are permanently watertight and weatherproof.

C. Install fabricated sheet metal items in accordance with manufacturer’s installation instructions and recommendations and with SMACNA Architectural Sheet Metal Manual.

D. Separations: Provide for separation of metal from dissimilar metal or corrosive substrates by coating concealed surfaces with zinc chromate, bituminous coating, or other permanent separation at locations of contact as recommended by manufacturer or fabricator. Do not use materials which are incompatible with roofing system.

E. Continuous Cleat: At exposed edges of perimeter edge, fascias, cap flashings, and where required, attach continuous cleat at six (6) inches on center with appropriate fasteners.

F. Gravel Guard/Fascia:

1. Install with expansion joints 10 feet o.c., 1/2 inch expansion leeway, with cover plate.
2. Set in asphalt mastic and fasten into nailer at 3 inches o.c. staggered.
3. Buff sand Kynar surface of flange and prime.
4. Strip in flange with specified stripping plies set in hot bitumen extending 3 inches from outer edge of flange to at least 3 inches inward towards gravel stop. Provide finish stripping ply of modified bitumen base ply in hot bitumen extending 6 inches from the outer edge of the flange and butt base of gravel stop.

G. Counterflashing:
1. Do not use surface mount counterflashing
2. Set in through wall with receiver and spring lock counterflashing, as detailed in drawings and to NRCA roofing manual, SMACNA standards.
3. Coordinate installation of through-wall flashing with the veneer contractor.
4. Seal through-wall in conjunction with substrate wall waterproofing.
5. Install wind clips 30 inches o.c. at all counterflashing over five (5) feet in length.

H. Liquid Applied Penetration Flashing System: (Sanitary Vent Stacks)
1. Precut fleece for wrapping pipe, ensure the fleece extends 4” up the pipe and the fingers extend a minimum of 2” onto the field. The fingers of the fleece should be approximately 1-2” wide. Ensure when wrapping the pipe, the fleece overlaps 1”.
2. Precut fleece for field, ensure the fleece extends 8” from the pipe in all directions. Using two pieces of fleece with overlap of 2” and cut out an opening for the pipe allowing a “snug” fit.
3. Dry fit all of the fleece for proper fit. Tape off 1” past the fleece in the field and on the pipe for clean application. Label fleece pieces (1,2,3) and mark on tape to ensure proper order of placement.
4. Buff sand penetration to create a rough surface.
5. Stir liquid flashing to ensure no separation.
6. Apply liquid flashing to the penetration at a rate of 2 gallons per square, ensuring there is no drips, dry spots and that the coverage is uniform.
7. Apply fleece to wet liquid flashing using the brush to ensure fingers spread correctly and lay flat. Apply liquid flashing in fleece 1” overlap to ensure fleece remains in place then apply liquid flashing to fleece on pipe and onto fingers. Apply in the direction of the fleece wrap to prevent voids, fish mouths, and/or creases in the fleece.
8. Apply liquid flashing to 1/2 of the field area at a rate of 2 gallons per square, look for similar coverage as the first application to the pipe and no dry spots.
9. Apply fleece into wet liquid flashing. Do not apply full coating on top just ensure it is set in place with light pressure.
10. Apply liquid flashing to the other 1/2 of the field area and in the area that will be overlapped by the second piece of field fleece.
11. Apply fleece into wet liquid flashing and coat the full field area with liquid flashing at a rate of 2 gallons per square. Ensure that the fleece is completely saturated and there are no voids or dry areas.
12. Remove tape around penetration and field and let dry 24 to 48 hours (curing time may vary with temperature and humidity)
13. Apply second coat of liquid flashing to pipe and field after first coat cures approximately 1-1/2” past the previous application at a rate of 2 gallons per square.
14. Broadcast granules into liquid flashing until refusal. Wait for coat to dry and then brush off remaining granules.

I. Roof Drains:
1. After membrane installation, prime bottom of lead flashing sheet and set in uniform bed of plastic roof cement at specified locations.

2. Extend lead flashing into drain bowl or pipe a minimum of two (2) inches and over top of piping/bowl connection, if possible. Apply a continuous bead of specified Type A sealant, at intersection of pipe and drain bowl.
3. If drain bowl and pipe connection is contaminated with bituminous material, strip-in area with three (3) coursing of plastic roof cement and fabric.
4. Prime top of lead flashing sheet to receive strip-in membrane.

J. Gutters / Downspouts:
1. Install gutters as detailed.
2. Install downspouts plumb and level, attached to columns or wall with straps located at top and bottom of downspout and maximum ten (10) feet on center.
3. Install splash pad or block under discharge port of downspouts. Install splash pan over a protection (walkway) pad for downspouts located at roof level.
4. End Caps, Downspout Outlets, Gutter and Downspout Straps, Support Brackets and joint fasteners to be manufactured to suit profile and dimension of gutter and downspout.
5. Install all anchoring devices as outlined in SMACNA.
6. Expansion Joints: Lap or Butt type per SMACNA, locate every 50 linear feet.

K. Expansion Joint:
1. Construct wood curbs as shown on drawings and as outlined in the NRCA and SMACNA Manuals.
2. Install underlayment, form envelope, and secure underlayment to curb. Fill envelope with compressible insulation.
3. Securely fasten expansion joint cover to curb with grommetted fasteners spaced six (6) inches on center.
4. Taper expansion joint down at the metal edge.

L. Coping:
1. Install wood nailers as shown on drawings.
2. Install metal cleats with appropriate fasteners spaced six (6) inches on center.
3. Install underlayment over the wood substrate. Lap ends minimum of six (6) inches and secure membrane in place. Seal laps with appropriate adhesive.
4. Install metal coping allowing 1/2 inch spaces between segments. Lock coping onto cleat and install appropriate fasteners through the interior fascia spaced 24 inches on center in enlarged holes.
5. Install cover plate centered over coping joint in continuous beads of specified Type B sealant, placed approximately one (1) inch from cover edges. Refer to SMACNA for alternate joints as required by length.
6. Install appropriate fastener through neoprene washer and cover plate between coping segments.
7. Accommodate building wall expansion joints by terminating coping joints and cleats either side of expansion joint. Do not run coping or cleats continuous across joints. Install coping cover plate to span across joint and lap coping on each side of joint a minimum of four (4) inches. Fasten cover plate on one (1) side of joint only. (Provide wall flashing membrane up and over parapet wall in accordance with manufacturer's detail.)

## 3.4 CLEANING AND PROTECTION

A. Remove flux and residual acid immediately by neutralizing with baking soda and washing with clean water. Leave work clean of stains.

B. Remove scraps and debris and leave work area clean.

C. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes. Paint areas where finish is damaged on pre-finished metal by painting with a compatible paint in color to match undamaged finish.

D. Prime soldered area of phosphatized metal after cleaning to prevent rusting.

E. Paint metal flashings that have been soiled with bitumen with aluminized paint.

F. Clean other work damaged or soiled by Work of this Section.

G. Protect finished work from damage.

**END OF SECTION 07 62 00**

# SECTION 07 72 00 ROOF ACCESSORIES

## PART 1 GENERAL

### 1.1 GENERAL REQUIREMENTS

A. Drawings and Conditions of Contract, including General and Supplementary Conditions and Division 1 Administration Sections, apply to this Division.

### 1.2 INSTALLATION RESPONSIBILITY

A. In addition to the items normally a part of this Section, coordinate the installation of roof accessory curbs and pipe flashing and equipment supports that may be specified elsewhere.

B. Coordinate the work specified herein with the following Work:
1. Roofing
2. Roofing sheet metal
3. Mechanical equipment
4. Plumbing

### 1.3 SUBMITTALS

A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details for roof accessories. Show layouts of roof accessories including plans and elevations. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other work.

C. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:
1. Size and location of roof accessories specified in this Section.
2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.

### 1.4 DELIVERY, STORAGE, AND HANDLING

A. Pack, handle, and ship roof accessories properly labeled in heavy-duty packaging to prevent damage.

### 1.5 WARRANTY

A. Warranty the Work specified herein for one (1) year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

B. Defects shall include, but not be limited to, the following:
1. Noticeable deterioration of finish
2. Leakage of water into the building or within the construction.

C. Rooftop supports – 5 year limited warranty.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

A. Specifications are based on products of named manufacturers. Other manufacturers must have a minimum of five (5) years experience manufacturing products meeting or exceeding the specifications and comply with Division 1 requirements regarding substitutions to be considered.

### 2.2 PREFABRICATED ROOF CURBS

A. Frames:
   1. Material: ASTM A 653 G90 hot-dipped galvanized steel.
      a. Minimum 18 gauge, and as engineered by manufacturer.
      b. Minimum 18 gauge for curbs supporting HVAC units
      c. Minimum 20 gauge for expansion joint curbs.
   2. Corners: Mitered and welded (welds are micro sealed and prime painted after fabrication). Bolted connections not accepted.
   3. Base Plates: Integral to frame and welded.
   4. Internally reinforced with galvanized 1 inch by 1 inch by 12 gauge angles for curbs exceeding 3 foot length. Reinforce internal bulkhead at equipment curbs to support lateral loads.
   5. Wood Nailers: Factory installed, pressure treated. Size and width as suitable for support of items installed on curbs.

B. Insulation: Factory installed 1-1/2 inch thick three-pound density fiberglass insulation.

C. Curb Height: Minimum 8 inch above finished roof.

D. Construct curbs to match roof slope with plumb and level top surface for mounting mechanical equipment.

E. Gasketing: 1/4 inch thick, one (1) inch wide at roof top units.

F. Counterflashing: 24 gauge stainless steel

G. Counterflashing Cap: Stainless steel.

H. Cants:
   1. Non-canted curb style installs either under or on top of metal decks with insulation.
   2. Cants shall be provided under Section 07 52 19 - Roofing

I. All insulated roof curbs shall be structural and shall include calculations signed and sealed by a registered Structural Engineer. Refer to installation drawings for any additional structural requirements. If curbs do not span a minimum of two bar joists, only two angles will be required. Coordination mechanical equipment weight loading on the roof with Structural Engineer.

J. Approved Manufacturers:
   1. Custom Curb, Inc.
   2. Roof Products, Inc.

## 2.3 PIPE SUPPORTS

A. Gas Pipe Supports:
   1. Lines less than 3” OD: (non penetrating)
      a. Provide strut and hanger type support with recycled plastics and carbon black for UV protection bases (10 inches x 16 inches x 3 inches; 6 lbs. each); Model Type 10-RAH-8 with strut, roller hanger and hold down clips for lines 2-1/2 inches and smaller
   2. Lines 3” OD or larger: (non penetrating)
      a. Provide strut and hanger type support with recycled plastics and carbon black for UV protection bases (18 inches x 16 inches x 3 inches; 10 inches x 16 inches x 3 inches; minimum 6 lbs. each); Model Type Model 8H-CP (Miro) with hanger and roller chair
   3. Approved Manufacture:
      a. Miro Industries, Inc.
      b. Portable Pipe Hanger, Inc.
      c. MAPA Products
      d. Architectural approved equal

B. Electrical Conduit / Condensate Lines:
   1. Lines less than 3” OD: (non penetrating)
      a. Provide strut type support with recycled plastics and carbon black for UV protection bases (10 inches x 16 inches x 3 inches; 6 lbs. each), Model Type 16-Base Strut-8
   2. Lines 3” OD or larger: (non penetrating)
      a. Provide strut and hanger type support with recycled plastics and carbon black for UV protection bases (18 inches x 16 inches x 3 inches; 10 inches x 16 inches x 3 inches; minimum 6 lbs. each); Model Type Model 8H-CP (Miro) with hanger
   3. Approved Manufacture:
      a. Miro Industries, Inc.
      b. Portable Pipe Hanger, Inc.
      c. MAPA Products
      d. Architectural approved equal

C. Chill Water Lines/Freon line sets:
   1. Lines less than 3” OD: (non penetrating)
      a. Provide strut and hanger type support with recycled plastics and carbon black for UV protection bases (10 inches x 16 inches x 3 inches; 6 lbs. each); Model Type 10-RAH-8 with strut, roller hanger and hold down clips for lines 2-1/2 inches and smaller,
   2. Lines 3” OD or larger: (non penetrating)
      a. Provide strut and hanger type support with recycled plastics and carbon black for UV protection bases (18 inches x 16 inches x 3 inches; 10 inches x 16 inches x 3 inches; minimum 6 lbs. each); Model Type Model 8H-CP (Miro) with hanger and roller chair
   3. Approved Manufacture:
      a. Miro Industries, Inc.
      b. Portable Pipe Hanger, Inc.
      c. MAPA Products
      d. Architectural approved equal

## 2.4 SEISMIC SUPPORT CURB

A. Equipment / Gas lines / Electrical Conduit / Condensate Lines / Etc. positive connection to structure. Unistrut welded to two (2) 10 gauge bent plates equally spaced across 4x6 wood

blocking/support curb. Plates set on neoprene isolationpad over galvanized metal cap of flashed into roof system as detailed on drawings and similar to outline of equipment support curb of NRCA guidelines.

## 2.5 ROOF TO ROOF EXPANSION JOINT

A. Stainless Steel expansion joint covers on new wood curbs, as detailed on drawings and outlined the NRCA and SMACNA manual.

## 2.6 RETROFIT ROOF DRAINS

A. Retrofit Roof Drains: “Hercules RetroDrain” as manufactured by OMG, Inc. or Architect approved equal.
   1. Size: To match existing roof drain sizes.
   2. Compliance:
      a. ANSI / SPRI RD-1.
      b. ULC / ORD-C790.4.
   3. Drain Body:
      a. Material: 1-piece, 11-gauge (0.125-inch) spun aluminum.
      b. Flange: 17-1/2-inch diameter.
   4. Drain Stem Length: 12 inches
   5. Flange Includes: Six 2-1/2-inch-long aluminum studs.
   6. Sump Area: Depressed.

B. Strainer Dome:
   1. Material: Cast aluminum.
   2. Height: 7.25 inches.
   3. Outside Base Diameter: 9.77 inches.

C. Clamping Ring:
   1. Material: Cast aluminum.
   2. Gravel Stop Height: 1.2 inches.
   3. Drainage Slots: 18 V-shaped.
   4. Bosses: 6, to accept studs on flange.

D. Backflow Seal:
   1. Compression Seal: Watertight, “U-Flow” mechanical seal.
   2. Material: Polyamide and EPDM rubber.
   3. Required for Activation: “U-Flow” screwdriver.

E. Hardware:
   1. Locknuts: 6, stainless steel, for studs.
   2. Screws: 3, stainless steel, to attach strainer to clamping ring.

F. Overflows:
   1. At overflow locations; provide overflow collar extension
   2. Constructed of spun aluminum

# PART 3 EXECUTION

## 3.1 INSTALLATION

A. Seismic Support Curbs: Install support line for positive connection to structure of each (new and existing) gas line, electrical conduit, condensate line, mechanical ductwork, freon line sets, etc running across new roof system.

1. Spacing: Shall not exceed twenty (20) feet on center. Curb not to exceed twelve (12) inches from any change in direction or elevation. Along with any additional locations indicated on drawings.
2. Piping containing liquid to be supported on roller accessories similar to specified for gasline pipe support. Install hold down clips or guides to ensure piping to stay in contact with roller support or Unistrut.

B. Non-Penetrating pipe supports: Install roof accessory in accordance with manufacturer’s printed instructions and approved shop drawings.
1. Spacing not to exceed six (6) feet on center between seismic support curbs. With in twelve (12) inches from any change in direction or elevation not support by seismic curb.
2. Provide roof manufacture protection pad below each support, tacked in place with approved mastic or adhesive.
3. Install hold down clips or guides to ensure piping to stay in contact with roller support or Unistrut.

## 3.2 CLEANING

A. Clean exposed surfaces according to manufacturer's written instructions.

**END OF SECTION 07 72 00**

# SECTION 23 00 00 - GENERAL MECHANICAL PROVISIONS

## PART 1 - GENERAL

1.01 GENERAL CONDITIONS:

A. The foregoing General and Special Conditions shall form a part of this Division with the same force and effect as though repeated herein. The provisions of this Section shall apply to all the Sections of Division 23.

1.02 CODES AND REGULATIONS:

A. All work and materials shall be in full accordance with current rules and regulations of applicable codes. Nothing in these drawings or specifications is to be construed to permit work not conforming to these codes. Should the drawings or specifications call for material or methods of construction of a higher quality or standard than required by these codes, the specifications shall govern. Applicable codes and regulations are:

1. California Code of Regulations – CCR:
   a. Title 8, Industrial Relations.
   b. Title 24, Building Standards.
2. California Building Code – CBC.
3. California Mechanical Code – CMC.
4. California Plumbing Code – CPC.
5. California Green Building Code.
6. Air Diffusion Council – ADC.
7. American Gas Association – AGA.
8. Air Moving and Conditioning Association – AMCA.
9. American National Standards Institute – ANSI.
10. Air Conditioning and Refrigeration Institute – ARI.
11. American Society of Heating, Refrigerating and Air Conditioning Engineers – ASHRAE.
12. American Society of Mechanical Engineers – ASME.
13. American Society for Testing and Materials – ASTM.
14. American Water Works Association – AWWA.
15. California Electrical Code – CEC.
16. National Electrical Manufacturers Association – NEMA.
17. National Fire Protection Association – NFPA.
18. Sheet Metal and Air Conditioning Contractors National Association – SMACNA.
19. Underwriters' Laboratory – UL.
20. Occupational Safety and Health Act - OSHA.

1.03 PERMITS AND FEES:

A. The Contractor shall take out all permits and arrange for all tests in connection with his work as required by local ordinances. All charges are to be included in the work. Permits for equipment connected to a particular system are to be considered as a part of the work included under each system; for example, permits for electric motor connection are part of electrical work, permits for domestic water or gas connections are part of plumbing work. All charges for service connections, meters, etc. by utility companies or districts shall be included in the work.

1.04 COORDINATION OF WORK:

A. Layout of materials, equipment and systems is generally diagrammatic unless specifically dimensioned. The actual locations of all materials, piping, ductwork, equipment, supports, etc. shall be carefully planned, prior to installation of any work, to avoid all interference's with each other, or with structural, electrical or architectural elements. Verify the proper voltage and

phase of all equipment with the electrical plans. All conflicts shall be called to the attention of the Engineer prior to the installation of any work or the ordering of any equipment.

1.05 GUARANTEE:

A. Guarantee shall be in accordance with the General Conditions. These specifications may extend the period of the guarantee for certain items. Where such extensions are called for, or where items are normally provided with guarantee periods in excess of that called for in the General Conditions, the Certificate of Guarantee shall be furnished to the Owner through the Engineer.

1.06 EXAMINATION OF SITE:

A. The Contractor shall examine the site, compare it with plans and specifications, and shall have satisfied himself as to the conditions under which the work is to be performed. No allowance shall subsequently be made in his behalf for any extra expense to which he may be put due to failure or neglect on his part to make such an examination.

1.07 SUBMITTALS:

A. Submit shop drawings in accordance with Division 01.

B. Shop Drawings: Within 30 days of contract award, the Contractor shall submit six copies of shop drawings for all materials, equipment, etc. proposed for use on this project. Material and equipment shall not be ordered or installed until written review is processed by the Engineer. Any item omitted from the submittal shall be provided as specified without substitution. All shop drawings must comply with the following:

1. Shop drawings are required for all material and equipment items and shall include manufacturer's name and catalog numbers, dimensions, capacities, performance curves, and all other characteristics and accessories as listed in the specifications or on the drawings. Descriptive literature shall be current factory brochures and submittal sheets. Capacities shall be certified by the factory.
2. All shop drawings shall be submitted at one time in a neat and orderly fashion in a suitable binder with title sheet including Project, Engineer, and Contractor; Table of Contents; and indexed tabs dividing each group of materials or item of equipment. All items shall be marked with the specification paragraph number for which they are proposed. All equipment shall also be identified by the mark number as indicated on the drawings.
3. All capacities, characteristics, and accessories called for in the specifications or on the drawings shall be highlighted, circled or underlined on the shop drawings. Calculations and other detailed data indicating how the item was selected shall be included for items that are not scheduled. Data must be complete enough to permit detailed comparison of every significant characteristic which is specified, scheduled, or detailed.

C. Substitutions: Manufacturers and model numbers listed in the specifications or on the drawings represent the standard of quality and the features desired. Unless otherwise noted, alternate manufacturers may be submitted for review by the Engineer. Calculations and other detailed data indicating how the item was selected shall be included. The Contractor shall assume full responsibility that substituted items or procedures will meet the specifications and job requirements and shall be responsible for the cost of redesign and modifications to the work caused by these items.

D. Review: Submittals will be reviewed for general conformance with the design concept, but this review does not guarantee quantity shown, nor does it supersede the responsibility of the Contractor to provide all materials, equipment and installation in accordance with the drawings and specifications. The Contractor shall agree that shop drawing submittals processed by the

Engineer are not Change Orders; that the purpose of shop drawing submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design concept; that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use. The Contractor shall agree that if deviations, discrepancies or conflicts between shop drawings and design drawings and specifications are discovered either prior to or after shop drawing submittals are processed by the Engineer, the design drawings and specifications shall control and shall be followed.

1.08 OPERATION AND MAINTENANCE INSTRUCTIONS:

A. Submit one electronic pdf copy for review and after approved submit three hard copies of the Operation and Maintenance Instructions and Wiring Diagrams for all equipment and parts lists for all equipment, etc. shall be submitted to the Engineer. All instructions shall be clearly identified by marking them with the same designation as the equipment item to which they apply (e.g. AC-1). All wiring diagrams shall agree with revised shop drawings and indicate the exact field installation. All instructions shall be submitted at the same time and shall be bound in a suitable binder with tabs dividing each type of equipment (e.g. Fans, Motors, etc.). Each binder shall be labeled indicating "Operating and Maintenance Instructions, Project Title, Contractor, Date" and shall have a Table of Contents listing all items included. **(These submittals shall be submitted with regular submittals at start of job so Commissioning Contractor can start on the commissioning check list for LEED Certification or Title 24 Requirements)**

B. Verbal: The Contractor shall verbally instruct the Owner's maintenance staff in the operation and maintenance of all equipment and systems. The controls contractor shall present that portion of the instruction that applies to the control system. The Engineer's office shall be notified 96 hours prior to this meeting.

C. Posted: The Contractor shall prepare operation instructions for all systems which shall be typewritten, reviewed by the Engineer, and mounted under glass adjacent to the appropriate temperature control panel. These instructions shall include applicable temperature control diagrams.

D. Acknowledgment: The Contractor shall prepare a letter indicating that all operation and maintenance instructions (printed, verbal and posted) have been given to the Owner, to the Owner's satisfaction. This letter shall be acknowledged (signed) by the Owner and submitted to the Engineer.

1.09 RECORD DRAWINGS:

A. The Contractor shall maintain a set of prints for the project as a record of all construction changes made. As the Work progresses, the Contractor shall maintain a record of all deviations in the Work from that indicated on the drawings. Final location of all underground work shall be recorded by depth from finished grade and by offset distance from permanent surface structures, i.e. buildings, curbs and walks. In addition, the water, gas, under-floor ducts, etc. within the building shall be recorded by offset distances from building walls. The original drawings will be made available to the Contractor from which he shall have a set of reproducible drawings made. The Contractor shall then transfer the changes, notations, etc. from the marked-up prints to the reproducible drawings. The record drawings (marked-up prints and reproducibles) shall be submitted to the Engineer for review (as an alternative, the marked-up prints may be photocopied full size on reproducible stock).

**PART 2 - PRODUCTS**

2.01 PROTECTIVE COATING FOR UNDERGROUND PIPING:

A. All ferrous pipe below grade (except cast iron) shall have a factory applied protective coating of extruded high density polyethylene, 35 to 70 mils total thickness, X-Tru Coat, Scotchkote. All fittings and areas of damaged coating shall be covered with two layer double wrap of 10 mil polyvinyl tape to total thickness of 40 mils. Manville Corporation. Protective coating shall be extended 6" above surrounding grade.

2.02 CONCRETE ANCHORS:

A. Concrete Anchors shall comply with CBC 1901A.3. Steel stud with expansion anchor requiring a drilled hole; powder driven anchors are not acceptable. Minimum concrete embedment shall be 4-1/2 diameters. Minimum spacing shall be 10 diameters center-to-center and 5 diameters from center to edge of concrete. Maximum allowable stresses for tension and shear shall be 80% of the test report values "with special inspection". Anchors shall be Hilti, Philips - or Approved equal.

2.03 SEISMIC RESTRAINTS:

A. All mechanical systems (all equipment, piping, etc.) shall be provided with seismic restraints in accordance with "Guidelines for Seismic Restraint of Mechanical Systems" dated 2006 by SMACNA.

2.04 SYSTEM IDENTIFICATION:

A. Above Grade Piping: Provide markers on piping which is either exposed or concealed in accessible spaces. For piping systems, other than drain and vent lines, indicate the fluid conveyed or its abbreviation, either by preprinted markers or stenciled marking, and include arrows to show the direction of flow. Comply with ANSI A13.1 for colors. Locate markers at ends of lines, near major branches and other interruptions including equipment in the line, where lines pass through floor, walls or ceilings or otherwise pass into inaccessible spaces, and at 50' maximum intervals along exposed portion of lines. Marking of short branches and repetitive branches for equipment connections is not required.

B. Equipment: All equipment shall be identified with a plastic laminated, engraved nameplate which bears the unit mark number as indicated on the drawings (e.g. AC-1). Provide 1/2" high lettering, white on black background. Nameplates shall be permanently secured to the unit.

C. Valves: Provide valve tags on all valves of each piping system, excluding check valves, valves within equipment, shut-off valves at equipment and other repetitive terminal units. Provide brass tags or plastic laminate tags. Prepare and submit a tagged valve schedule, listing each valve by tag number, location and piping service. Mount in glazed frame where directed.

D. Controls: Label all panels, thermostats and by-pass timers with plastic laminated, engraved nameplate which bears the unit mark number as indicated on the drawings (e.g. AC-1). Provide 1/4" high lettering, white on black background. Nameplates shall be permanently secured to the unit.

2.05 EQUIPMENT SUPPORT FRAMES:

A. Unless specifically noted otherwise, it shall be the responsibility of Mechanical Contractor to furnish and install all support frames for its equipment.

**PART 3 - EXECUTION**

3.01 SCHEDULING OF WORK:

A. All work shall be scheduled subject to the approval of the Engineer and Owner. No work shall interfere with the operation of the existing facilities on or adjacent to the site.

3.02 CONDUCT OF WORK:

A. The Contractor shall have at all times, as conditions permit, a sufficient force of workmen and quantity of materials to install the work contracted for as rapidly as possible consistent with good work, and shall cause no delay to other Divisions engaged upon this project or to the Owner.

B. Mechanical Contractor shall arrange for all cutting necessary for the proper installation of its work, providing all sleeves and chases necessary. Cutting shall not be done in such a manner to impair the strength of the structure. Any damage resulting from work shall be repaired by the Contractor at his expense to the satisfaction of the Engineer.

C. Progressively, daily at the completion of each day's work, and at completion of the job, the Contractor shall thoroughly clean all of his work, removing all debris, stain and marks resulting from his work.

**D. IAQ Management plan will be in effect for LEED Certification, including the sealing of duct ends before and during rough-in, specific requirements for the use of HVAC equipment during construction (if used at all), building flush-out, etc. Adhesives and mastic must comply with low VOC requirements and documentation (MSDS, etc.) shall be provided with submittals.**

3.03 EXCAVATION AND BACKFILL:

A. Excavation: Trenches are to be excavated to grade and depth established by drawings. Unless otherwise noted, minimum earth cover above top of pipe shall be 24", not including base and paving in paved areas. Width of trenches at top of pipe shall be a minimum of 16" plus the outside diameter of the pipe. Provide all shoring required by site conditions. Barrel of pipe shall have uniform support on trench bottom, hand excavate additional depth at bells, hubs and fittings. Where over-excavation occurs, provide compacted selected backfill to pipe bottom. Where ground water is encountered, remove to keep excavation dry, using well points and pumps as required.

B. Backfill:

1. Around Pipe and to One Foot Above Pipe: Material shall be river run sand or native granular free flowing material, free of clay lumps, silt or vegetable matter and shall have 100% passing through the No. 4 sieve and a maximum of 3% passing through the No. 200 sieve. Place carefully around and on top of pipe, taking care not to disturb piping. Consolidate with vibrator.
2. One Foot Above Pipe to Grade: Material to be sandy or silty loam, free of lumps, laid in 6" layers, uniformly mixed, to proper moisture and compacted to required density. If backfill is determined to be suitable and required compaction is demonstrated by laboratory test, water compaction in 6" layers may be used, subject to approval by the Engineer.
3. Remove all water sensitive settlement from trench backfill regardless of location and compaction requirements.

C. Compaction: Compact to a density of 95% within building and 90% outside building. Demonstrate proper compaction by testing at one-half of the trench depth. Perform three tests per 100' of trench.

3.04 OPENINGS, CUTTING AND PATCHING:

A. The locations and dimensions for openings through walls, floors, ceilings, foundations, footings, etc. required to accomplish the work under this Specification Division shall be provided under this Division. The actual openings and the required cutting and patching shall be provided. Coring through existing concrete or masonry walls, floors, ceilings, foundations, footings, etc., and saw cutting of concrete floors or asphaltic concrete required to accomplish the work under this Specification Division shall be provided under this Division. Patching of these surfaces shall also be provided. Cutting and coring shall not impair the strength of the structure. Any damage resulting from this work shall be repaired at the Contractor's expense to the satisfaction of the Engineer.

3.05 MANUFACTURER'S RECOMMENDATIONS:

A. All material, equipment, devices, etc., shall be installed in accordance with the recommendations of the manufacturer of a particular item. The Contractor shall be responsible for all installations contrary to the manufacturer's recommendations. The Contractor shall make all necessary changes and revisions to achieve such compliance. Manufacturer's installation instructions shall be delivered to and maintained at the job site through the construction of the project.

3.06 QUIETNESS:

A. Piping, ductwork and equipment shall be arranged and supported so that vibration is a minimum and is not carried to the building structure or spaces.

3.07 DAMAGES BY LEAKS:

A. The Contractor shall be responsible for damages to other work caused by leaks in the temporary or permanent piping systems prior to completion of work and during the period of the guarantee, and for damages to other work caused by disconnected pipes or fittings, and the overflow of equipment prior to completion of the work.

3.08 CLEANING:

A. Progressively and at completion of the job, the Contractor shall thoroughly clean all of his work, removing all debris, stain and marks resulting from his work.

**END OF SECTION 23 00 00**

# SECTION 23 00 01- HEATING, VENTILATING AND AIR CONDITIONING

## PART 1 - GENERAL

1.01 GENERAL CONDITIONS:

A. The foregoing Section 23 00 00, General Mechanical Provisions shall form a part of this specification.

1.02 SCOPE:

A. Included: Perform all work necessary and required to complete construction as indicated. Such work includes the furnishings of all labor, materials and services necessary for a complete, lawful and operating air conditioning, heating, ventilating system with all equipment as shown or noted on the drawings or as specified herein. The work includes, but is not necessarily limited to, the following:

1. Heating, ventilating and air conditioning equipment.
2. System insulation.

B. Work Specified Elsewhere:

1. Line voltage power wiring (60 volts or greater), motor starters in motor control centers, and disconnect switches are included in the electrical section.
2. Connection of gas and condensate drains to equipment.
3. Access doors.

## PART 2 - MATERIALS

2.01 DUCTWORK MATERIALS:

A. General: All ductwork materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL-181 not exceeding a flame spread of 25 and smoke developed of 50. All ductwork shall be per Chapter 6 of the CMC.

B. Low Velocity Metal Ductwork: Metal ductwork shall be minimum 26 gauge galvanized sheet steel, ASTM A527.

C. Low Velocity Flexible Ductwork: Insulated flexible ductwork. Continuous internal liner bonded to galvanized steel wire helix. One pound per cubic foot glass fiber insulation, R-8. Thermal conductivity shall not exceed 0.13 Btu/hr sq. ft.- degrees F at a mean temperature of 75°F. Seamless vapor barrier jacket. Each length shall have a factory installed metal sleeve at each end. Duct shall be capable of continuous operation at 1.5" of water static pressure and 4000 ft./ min. air velocity. Maximum length 5 ft., single piece at runouts to air terminals. Genflex, Lamborn or equal.

D. Spiral Duct: Ductwork shall be galvanized steel with uni-seal spiral seamlock and uni-seal fittings, ASTM A653. United McGill Corp or equal. All exposed spiral duct shall be painted, color selected by Owner.

E. Round Duct on Roof: Ductwork shall be double wall insulated galvanized steel with solid welded seam longitudinal seam-K27. United McGill Corp or equal.

F. Bonding Adhesive: Durodyne WBG, Scotchgrip Adhesive 4230 or equal.

G. Duct Mastic: Minnesota Mining and Manufacturing Duct Sealer 800, Tuff-Bond No. 12, Glencoat Seal-Flex or equal.

H. Duct Joints:

1. As an option to joints and seams designated by SMACNA or shown on Drawings, the following systems may be used:
   a. Ducts with sides 24 inches to 48 inches, transverse duct joint system by Ductmate Jr., Nexus or equal (SMACNA "E" Type connection).
   b. Ducts 48 inches and larger, Ductmate Regular, Nexus (SMACNA "J" Type connection) or equal.

I. Fiber Tape: Mineral impregnated fiber tape and plastic activator-adhesive. Hardcast Inc., United McGill Uni-Cast or equal.

2.02 DUCT FITTINGS:

A. Turning Vanes: Double wall, hollow metal, air-foil shape. Spacing in accordance with manufacturer's recommendations. Aero Dyne, HEP or equal.

B. Flexible Connection: UL listed neoprene coated 30-ounce fiberglass cloth. 3" metal, 6" fabric, 3" metal. Ventglas or equal.

C. Branch Duct Volume Damper: Volume control damper (VCD) in rectangular ducts shall be as follows: Opposed blade, 6” maximum blade width, 16-gage blade, 48” maximum length, nylon or oil impregnated bronze bearings, ½” diameter pin shaft, 16-gage channel frame, actuating rod and linkage out of air stream. VCD in round duct shall be as follows: Damper blade full height of branch and 1” less than branch width. All branch dampers shall have regulator with stamped steel handle, spring loaded shaft nut, cast body and serrated self-locking die cast core. Regulator for horizontal ducts overhead shall be mounted on sides or bottom of ducts. Secure a 12” length of brightly colored plastic ribbon to handle for ease of location. Where rectangular or round ductwork is insulated, slit insulation to allow handle to protrude. Ventlok 641 (with 607 end bearing for round ducts).

D. Fire/ Smoke Damper: Multi-blade construction in accordance with CBC & CMC. UL 555 and UL 555S labels. Blades shall have metal-to-metal seals and not rely on actuator torque to maintain leakage rating. Prefco, Air Balance, Ruskin, Greenheck 5020-1 with 5800MB2 power open/spring close operator, or equal.

E. Fire Damper: Dynamic rated fire dampers, U.L. 555 label. Prefco, Air Balance, Ruskin, Greenheck or equal.

F. Louvers: Refer to the Air Distribution Schedule on the drawings. Manufacturer’s model numbers are listed to complete the description. Equivalent models of Ruskin, Greenheck, Dayton or approved equal. Contractor shall fabricate and provide 16 GA. galvanized perforated panel (50% Free Area) over exterior of all louvers and have field painted to match exterior wall. Refer to the floor plans for all sizes.

2.03 DUCTWORK INSULATION MATERIALS:

A. General: All ductwork insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL-181 not exceeding a flame spread of 25 and smoke developed of 50.

B. Acoustic Lining: Glass fiber. One side coated to prevent fiber erosion up to 6000 ft./ min. Average noise reduction coefficient of 0.90. 0.13 Btu/ hr – sq. ft. – degrees F conductivity at a mean temperature of 75 degrees F, R-8. CSG Insulation Corp., Schuller, Owens-Corning, Knauf or equal. Duct dimensions shown on drawings for lined duct are clear (net) opening inside of lining.

C. Fiber Glass Blanket: Foil faced, 0.13 Btu/ hr – sq. ft. – degrees F conductivity at a mean temperature of 75 degrees F, R-8. CSG Insulation Corp., Schuller, Owens-Corning, Knauf or equal.

D. Bonding Adhesive: Benjamin Foster 85-15 or equal.

2.04 PIPING MATERIALS:

A. Flue Piping:

1. Gas Flue Piping: Flue pipe shall be type as recommended by equipment manufacturer for which the pipe is connected to. UL listed. Metalbestos, Amerivent or equal.
2. Flue Cap: Designed to properly ventilate flue regardless of wind direction. Storm proof, bird proof. Metalbestos, Amerivent or equal.

B. Flue/ Combustion Air Piping:

1. Gas Flue Piping: Schedule 40 PVC pipe with solvent weld fittings.
2. Flue Cap: Designed to properly ventilate flue regardless of wind direction. Storm proof, bird proof. Factory concentric vent/ combustion air termination kit.

C. Refrigerant Piping:

1. Type L hard temper seamless copper, ASTM B88. Wrought copper fittings ANSI B16.22. 50/ 50 lead-tin solder joints above grade, 95/ 5 tin-silver brazed joints below grade. Provide schedule 40 PVC sleeve pipe for all below grade refrigerant piping. All piping shall be sized per equipment manufacturer requirements.
2. Valves and Specialties:
   a. Line Valves: Bronze body, ball type, TFE locked in seals. Back seated valve stem. Contromatics C-11.
   b. Filter-Drier: Replaceable core. Capacity in accordance with ARI Standard 710. Sporlan "Catch-All".
   c. Moisture Indicator-Sight Glass: Double port. Henry, Sporlan.
   d. Vibration Isolating Connection: Seamless flexible bronze tubing, braid covered. Suitable for system pressure. American, Flexonics.

D. Miscellaneous Piping Items:

1. Pipe Support:
   a. Pipe Hanger: Adjustable split ring, swivel hanger and rod. Black malleable iron. Size and maximum loads per manufacturer's recommendation. Felt Lined, Kin-Line 450 F.
   b. Construction Channel: 12 gage 1-5/8" x 1-5/8" steel channel. Single or multiple sections. Self-locking nuts and fittings. Kin-Line, Unistrut.
2. Pipe Sleeves: 24 gage galvanized steel. Adjus-to-Crete #10 with #99 thimble for floors. #100 for walls.

E. Flashing: Flashing for piping through roof shall be prefabricated 24 gage galvanized steel roof jacks with 8" square flange around pipe. Seal with weatherproofing mastic.

2.05 PIPING INSULATION MATERIALS:

A. General: All piping insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.

B. Refrigerant Piping: Rubber based elastomeric preformed pipe insulation. Thermal conductivity shall not exceed 0.25 Btu-in/hr-SF-degree F at mean temperature of 75 degrees F., 3/4" thick. Provide aluminum pipe and fitting jacketing. 0.016” thickness for straight pipe, 0.024” thickness

for fittings with integral moisture barrier, pre-fabricated strapping and seals for piping exposed to weather, Childers, Pabco or equal.

1. Insulation shall be provided on both refrigerant lines for ductless split systems.

2.06 EQUIPMENT:

A. General Requirements:

1. Capacity: Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.
2. Dimensions: Equipment must conform to space requirements and limitations as indicated on drawings and as required for operation and maintenance. Where Architectural screening is indicated, equipment shall not extend above or beyond screening. Equipment will not be accepted that does not readily conform to space conditions. Prepare and submit layout drawings for all proposed equipment (different than scheduled units) showing actual job conditions, required clearances for proper operation, maintenance, etc.
3. Ratings:
   a. Gas: Gas burning equipment shall be furnished with 100% safety gas shut-off, intermittent pilot ignition, and be CSA (US) certified, except that boilers shall be CSA (US) certified or UL listed.
   b. Electrical: Electrical equipment shall be in accordance with NEMA Standards and UL or ETL listed where applicable standards have been established.
4. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided. Equipment requiring domestic water for non-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.
5. Electrical:
   a. General: Each item or assembly of items shall be furnished completely wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories and controls required by equipment shall be furnished. Provide terminal blocks for controls and interlocks not included in equipment package. Manual and magnetic starters shall have ambient compensating running overcurrent protection in all ungrounded conductors. Magnetic starters shall be manual reset, shall have H-O-A switches and auxiliary contacts. Controllers and other devices shall be in NEMA 1 or 3R enclosures as applicable.
   b. Wiring: Conductors, conduit, and wiring shall be in accordance with Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts and other devices shall be in ungrounded conductors.
   c. Motors: Shall be rated, constructed and applied in accordance with NEMA and ANSI Standards without using service factor. Single-phase motor shall be of type to suit application. Three-phase motors shall be open drip proof, NEMA B design on pumps and fans, NEMA C on reciprocating equipment, sealed ball bearing, three-phase induction unless otherwise noted. Design shall limit starting inrush current and running current to values shown on drawings. Motors 1 horsepower and larger shall be the premium efficiency type, tested according to IEEE Standard 112, Method B. Motors exposed to weather shall be TEFC. Motors in a fan air stream shall be TEFC or TEAO. Vertical motors outdoors shall be ODP or TEFC and shall have rain caps.
   d. Starters: Motor starters shall be furnished for all equipment except where starter is in a motor control center as designated on the electrical drawings. Deliver starter to Electrical Contractor for installation and wiring.
   e. Control Voltage: Equipment connected to greater than 240 volts shall be provided with 120 volt control circuit from integral protected transformer if separate source is not indicated on plans. 240 volt control is acceptable if confined within control panel.

f. Submittals: Included in shop drawings shall be internal wiring diagrams and manufacturer's recommend external wiring.

6. Fan Selection:
   a. Fan Curves: Performance curves shall be submitted for all units of 3000 CFM or greater. Operating point for forward curved fans shall be from point of maximum efficiency towards increased CFM limited by horsepower scheduled. Operating point for backward inclined fans shall be selected near point of maximum efficiency. Curves shall plot CFM verses static pressure with constant brake horsepower, RPM and efficiency lines.
   b. Static Pressure: Unless otherwise noted, pressure scheduled as external static pressure (ESP) includes all ductwork and accessory losses external to the unit housing. Unless otherwise noted, pressure scheduled as total static pressure includes all ductwork, filter, coil, cabinet, damper and other accessory losses. Unless otherwise noted, pressure scheduled as duct static pressure includes all supply and return ductwork and accessory losses external to the unit housing and plenum (as applicable). The allowance for filter losses is 0.3" WC, unless otherwise noted. Submit itemized static pressure losses for all components.
7. Filters:
   a. General: Tested and rated in accordance with ASHRAE Standard 52.2 and Title 24, C.C.R. Furnish and install one complete change of all filters after air balance in completed and prior to acceptance. Provide pressure differential gage across all filter banks.
   b. Filter Media: 2" pleated media. MERV-13. Clean filter resistance 0.25" water at 500 fpm. Throw-away frame. Class 2. Camfil Farr AP-Eleven.
   c. Pressure Differential Gage: Diaphragm actuated. 4" dial. Zero adjustment. Accuracy +/ - 2% of full scale. Range as required. Provide static pressure sensors, tubing and mounting brackets. Dwyer Series 2000. Mark gage to indicate filter replacement pressure, coordinate point with filter and equipment manufacturers.
8. Mixing Dampers: Opposed blade, 16-gage. Six-inch maximum blade width, 48" maximum length. Nylon or oil impregnated bronze bearings. One-half inch diameter pin shaft. 16-gage channel frame. One percent maximum leakage at 4" WC in accordance with AMCA 500 for outside air dampers. Actuating rod out of air stream. Arrow.
9. Sound Ratings: Shall be in accordance with ASHRAE 36-72. Sound ratings shall not exceed scheduled values.
10. Drives: Unless noted as direct connected, drives shall be V-belt, rated at 150% of motor horsepower. Multiple drive belts shall be matched set. Drive sheaves shall be dynamically balanced, adjustable, range +/ - 10%, selected at mid range. Adjustable relative movement shall be lockable to shaft. Belts shall be aligned within 1-1/2 degrees at all times. Open drives shall be provided with OSHA approved open mesh belt guards. Belt guards exposed to weather shall be weatherproof enclosure with louvered face for adequate ventilation. Driving motor shall be mounted on adjustable rails. T.B. Woods, Browning. Submit RPM range of driven machine with drive selection.

B. Air Conditioning Unit (thru 15 tons):

1. General: Self-contained heating/cooling unit designed for outdoor installation. Factory assembled and tested. Provide all starters and relays required for operation. 24 volt control circuit from integral transformer. Weatherproof cabinet, galvanized steel with enamel finish. Drain pan. Multivane, centrifugal supply fan. ARI certified. Gas equipment AGA certified. Carrier, York, Trane, or approved equal.
2. Refrigeration: Sealed Hermetic compressor with heater, high/ low pressure switch, recycling timer. Air-cooled condenser with propeller fan. Non-ferrous finned coil. Low ambient control to 45 degrees F, unless otherwise noted.
3. Heat: Gas fired. Aluminized or ceramic-coated welded steel heat exchanger. Electric ignition. Automatic gas valve, 100% safety shutoff.

4. Automatic Shutoff: For units or zones providing air in excess of 2000 cfm, reconnect to existing fire alarm relay to automatically shut off all power to air moving equipment and alert fire alarm system when smoke is detected in accordance with CMC Section 608.
5. Economizer: Economizer shall be a modulating gear driven type where the outside air will modulate from closed to minimum outside air setpoint and 100% during economizer mode. Economizer is shipped separately and shall be field installed and wired under this section.
6. Guarantee: Provide 5 year extended parts warranty on the condenser coil and compressor.

**PART 3 – EXECUTION**

3.01 DUCTWORK INSTALLATION:

A. General:

1. Standards: Unless otherwise noted, all ductwork shall be constructed and installed in accordance with current SMACNA "HVAC Duct Construction Standards". Ductwork and accessories shall be installed in a manner to prevent vibration and rattling.
2. Seismic bracing: All ducts shall be braced and supported per SMACNA Guidelines for “Seismic Restraints Manual for Mechanical Systems” dated 1998, including Appendix E.
3. Duct Access Doors: Provide access doors as required to adjust equipment and dampers.
4. Flexible Connections: Connections of ductwork to all equipment shall be with 6" (min.) flexible connection. Install with ample slack and uniform gap after deflection of vibration isolators. There shall be no metal to metal contact across flexible connection. Protect outdoor connections with weatherproof metal shroud on top and sides, no metal-to-metal contact. Provide at all seismic joints.
5. Ducted Returns: All air handling that is not directly located in the space that it serves shall have ducted returns.
6. Open ends of ductwork shall be covered during construction to keep inside clean.

B. Low Velocity-Low Pressure (up to 2000 ft/ min; up to 2.0 in. water):

1. Sheet Metal Ductwork:
   a. Ells: Ells with less than standard radius and square ells shall be fitted with turning vanes.
   b. Tees: Tees shall be straight tap-in with extractor or 45 degree takeoff, as shown on drawings.
   c. Duct Joints: Seal duct joints airtight with fiber tape and adhesive per manufacturer's printed instruction. Ducts in weather shall be sealed air and water tight with duct mastic before closing and taping.
      i. Where Ductmate type joints are used, the manufacturer's designated procedure shall be followed. Ductmate joints on roof shall have continuous cleat on top duct flange to prevent water from collecting on gasket.
   d. Dampers: Install volume control damper and damper regulator in all branch ducts.
   e. Duct dimensions shown on drawings for lined ducts, are clear net openings inside of lining.
   f. Top of ducts exposed to weather shall be cross broken and sloped slightly to each side to allow rain water to run off. Ducts that do not drain off top will be rejected and need to be replaced at contractors’ expense.
2. Flexible Glass Fiber Ductwork: Hangers shall be 2" wide metal straps spaced to prevent sagging, 3 feet spacing maximum. Insert 6" wide fiberglass pad between duct and hanging strap. All joints and fittings shall be sheet metal and shall be installed with metal bands or 3 (min) self-tapping screws and fiber tape. Maximum length of flexible duct shall be 5 ft. Single piece minimum length shall be 3 ft. Minimum turn radius shall be in accordance with SMACNA Standards (turn radius to duct centerline not less than 1.5 times the duct diameter).

3.02 DUCT FITTINGS INSTALLATION:

A. General: Unless otherwise noted, all air terminals and duct fittings shall be installed in accordance with current SMACNA "HVAC Duct Construction Standards", details on drawings and manufacturers instructions. Terminals and fittings shall be installed in a manner to prevent vibration and rattling.

3.03 DUCTWORK INSULATION INSTALLATION:

A. General: All supply and return sheet metal ductwork shall be insulated.

B. Concealed Ductwork: Wrap ductwork with fiberglass blanket lapped 2" minimum. Secure with foil tape at all joints for a complete vapor barrier.

C. Acoustic Lining: All ductwork in equipment rooms, where exposed to weather, and elsewhere as indicated on drawings, shall have acoustic lining. Increase each sheet metal dimension to accommodate lining and maintain clear inside duct dimensions shown on drawings. Apply lining with bonding adhesive in accordance with manufacturer's recommendations and also secure with mechanical fasteners in accordance with SMACNA Standards. Seal exposed edges of lining with bonding adhesive.

3.04 PIPING INSTALLATION:

A. General:

1. Piping Layout: Piping shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location to be approved by Architect. No structural member shall be weakened by cutting, notching, boring or otherwise unless specifically allowed by structural drawings and/ or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. All piping shall be installed in a manner to ensure unrestricted flow, eliminate air pockets, prevent any unusual noise, and permit complete drainage of the system. All piping shall be installed to permit expansion and contraction without strain on piping or equipment. Expansion joints and/or flexible connectors shall be installed as required. Vertical lines shall be installed to allow for building settlement without damage to piping. Lines shall be adequately braced against vertical and lateral movement.
2. Pipe Support:
   a. General: Hangers shall be placed to support piping without strain on joints or fittings. Maximum spacing between supports shall be as specified below. Actual spacing requirements will depend on structural system. Refer to drawings for additional requirements and attachment to structure. Vertical piping shall be supported at floor and ceiling. Support pipe within 12" of all changes in direction. No perforated straphanger shall be used in any work.
   b. Refrigerant Piping: Pipe shall be cut square. Joint surfaces shall be thoroughly cleaned, fitted and erected before brazing. Install specified accessories. After installation, evacuate to 29 inches of mercury, ambient temperature during evacuation shall not be less than 70 degrees F. After evacuation, fill with dry nitrogen to 250 psi and maintain for two-hour period without additional charge. After nitrogen test, purge with refrigerant charged through dryer and maintain holding charge in system and equipment. Refrigerant piping below grade shall be run in 4” (min.) PVC conduit with long radius ells. Seal ends of conduit watertight.
   c. Flue Piping: Flue piping shall be installed in accordance with its UL listing and manufacturer's instructions. All welders shall be certified in accordance with AWS Standard D9.1, Specifications for welding sheet metal.

d. PVC Piping: Shall be cut square and assembled prior to solvent weld. Apply primer per manufacturer's recommendations. Coat male joint fully with solvent, make joint before solvent dries and wipe exterior clean.

3.05 PIPING INSULATION INSTALLATION:

A. Refrigerant Piping: Cover suction piping with foamed plastic insulation. Longitudinal and end seams shall be thoroughly cemented with adhesive in accordance with manufacturer's recommendation. Cover all fittings, unions, valves, and connections. Piping exposed to weather shall be covered with aluminum jacketing, seal all joints and seams with grey outdoor mastic or silver silicone sealant. Piping exposed in room shall be covered with piping chase painted to match wall.

3.06 EQUIPMENT INSTALLATION:

A. General: It shall be the responsibility of the contractor to insure that no work done under other specification sections shall in any way block, or otherwise hinder access panels or diminish the effectiveness of equipment vibration isolation.

B. Connections to Equipment: Where size reductions are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet. Connections made to equipment mounted on vibration isolators shall be with flexible connectors, installed adjacent to equipment.

C. Start Up: Engage manufacturer or factory-authorized service representative to perform start up supervision. Manufacturer shall provide on-site start up and commissioning assistance through job completion. Complete installation and start up checks according to manufacturer's written instructions.

3.07 TEMPERATURE CONTROL SYSTEM:

A. Thermostats shall have the capability of terminating all heating at a temperature of no more than 70 degrees F, or terminating all cooling at a temperature of no less than 78 degrees F, and to provide a temperature range of up to 10 degrees F between full heating and full cooling. Thermostats shall be 7 day programmable, Carrier, Venstar or equal with sub-base capable of battery back up or capacitor to retain program in the event of a power outage. All control wiring, regardless of voltage, shall be installed in conduit.

3.08 SYSTEM AIR BALANCE:

A. Scope: Provide the services of a qualified independent test and balance agency certified by the Associated Air Balance Council (AABC) or The National Environmental Balancing Bureau (NEBB) to test, adjust and balance, retest, and record performance of the system to obtain design quantities as specified. Balancing contractor must also be TABB certified and have a C-20 license.

B. Qualifications: Prior to commencing work, the agency shall be approved by the Owner's Representative.

C. Instruments: All instruments shall be accurately calibrated; calibration histories shall be available for examination. Application of instrumentation shall be in accordance with AABC standards.

D. Procedure: General: Balanced quantities shall be plus 5%, minus 5% of design quantities. All name-plate data, manufacturer, model, and serial numbers shall be recorded for each item tested.

E. Extended Warranty: The test and balance agency shall include an extended warranty of 90 days after completion of test and balance work, during which time the Owner's Representative at his discretion may request a recheck or resetting of any item or items in test report. The agency shall provide technicians to assist the Owner's Representative in making any tests he may require during this period of time.

F. Air Balance Procedure (for each Air Conditioning System):

1. All air filters shall be clean when air balance is performed.
2. Provide a sketch of the equipment showing exactly where all pressure readings were taken.
3. Adjust blower RPM to design requirements.
4. Record motor full load amperes.
5. Make pitot tube traverse of main supply and return ducts and obtain design CFM at fans.
6. Record system static pressures, inlet and discharge.
7. Record filter quantity, size(s) and pressure drop across filter(s) at each filter bank.
8. Adjust system for design CFM recirculated air.
9. Adjust system for design CFM outside air.
10. Record entering air temperatures. (DB heating, DB and WB cooling.)
11. Record leaving air temperatures. (DB heating, DB and WB cooling.)
12. Adjust all main supply and return air ducts to design CFM.
13. Adjust all zones to design CFM, supply and return.
14. As a part of the work of this contract, THE AIR CONDITIONING CONTRACTOR shall make any changes in pulleys, belts, dampers or the addition of dampers cleaning of insect screens and replacement of filters required for correct balance as recommended by air balance agency, at no additional cost to Owner.
15. Set, test and adjust packaged heating/ cooling unit economizer operation in cooperation with controls contractor. Record minimum and maximum outside and exhaust airflows.

G. Test, adjust and retest water bleed rates from evaporative coolers. Record all data.

H. Acoustic Performance Testing: Provide acoustic performance testing in accordance with the requirements of EQ3.0 of the "California Criteria for High Performance Schools, Best Practices Manual, 2009 Edition".

1. Maximum Background Noise Level: Unoccupied classrooms must have a maximum background noise level of no more than 45 dBA LAeq. The standard anticipates two primary noise sources, steady HVAC equipment noise and the usually unsteady exterior environmental noise. Where the measured ambient noises due to sources other than HVAC are within 5 dB of the measured overall noise (HVAC and exterior intrusive noise) a measurement of at least ½ hour duration shall be made in at least two classrooms in each building in the worse case (noisiest) locations on the school site during normal school days and hours.
   a. To evaluate the significance of intrusive exterior noise, a 30-minute Equivalent Sound Level (LAeq30, in general conformance with ANSI S12.60-2002, Annex E3) measurement shall be made in the classroom that is subjectively assessed to represent the worse case exposure to exterior noise, with the HVAC system not in operation. This Leq30 measurement shall be repeated with the HVAC in operation. If the second "HVAC-on" sound level is more than 5 dB greater than the initial "HVAC-off" measurement, exterior noise intrusion shall be deemed "not significant".
   b. Where intrusive exterior noise has been deemed "not significant" short-term (15 second) A-weighted sound level measurements shall be made in each classroom with the HVAC systems in operation. Where exterior intrusive noise has been deemed "significant" (per the evaluation method noted above), LAeq30 sound level measurements shall be made in each classroom with the HVAC system in operation. In either case, where classrooms are served by variable-air-volume systems, the systems shall be operated at maximum nominal flow (typically by means of varying the thermostat set point).

c. Where exposure to exterior noise varies significantly between groups of classrooms (e.g. one side of a classroom wing adjacent to a street, the other side facing away), separate evaluations of exterior noise significance can be conducted to limit the need for LAeq30 measurements.

2. Maximum Reverberation: Classrooms less than 10,000 cubic feet must have a 0.6-second maximum (unoccupied) reverberation time and classrooms with volumes between 10,000 cubic feet and 20,000 cubic feet must have a 0.7-second maximum (unoccupied, furnished, and fitted-out) reverberation time. (ANSI Standard S12.60-2002). The reverberation times shall be measured in each classroom in three octave bands with center frequencies of 500, 1000, and 2000 Hz. The arithmetic average of the three measured values shall be compared to the standard.

**END OF SECTION 23 00 01**