



## **Design Standard Thermal and Moisture Protection**

### **Purpose:**

This design standard has the purpose of creating a consistent application of roofing, waterproofing and insulation work throughout the South San Francisco Unified School District thereby achieving a standard of aesthetic quality, maintenance and performance throughout all renovation and new building projects.

### **Design Standard:**

#### **Roofing**

##### **General Requirements**

- Roof system design shall incorporate all aspects of roof waterproofing, including parapet walls, skylights, flashings, drains, scuppers, gutters, downspouts, etc. Comply with current NRCA and SMACNA standards.
- All new low-slope roofs and all low-slope roofing replacements greater than 2,000 s.f. or more than 50% of the roof area (whichever is less) must be designed and installed to comply with CCR Title 24, Part 6 Building Energy Efficiency Standards, which include cool roof requirements as determined by the Cool Roof Rating Council (CRRC). Regardless of the type of low-slope roofing system, the specifications shall include the requirement that the finish on the roof covering comply with CRRC requirements for a cool roof. Consider specifying cool roof products at high-slope roofs as well. Refer to CRRC's rated product directory on the CRRC website ([www.coolroofs.org](http://www.coolroofs.org)).
- Roofing systems shall be designed for a minimum 30-year non-prorated, labor-and-materials warranty with single-source supply of roofing materials, flashings, sheet metal and accessories. The warranty shall not require purchase of a manufacturer's maintenance program, and only routine District maintenance involving such tasks as cleaning debris and unclogging roof drains shall be necessary.
- Installers must submit a manufacturer's list of 3 roofs they have installed, located within 50 miles of South San Francisco, of equal size and degree of difficulty, which have been in place for a period of 5 years and have been performing successfully for that period. All manufacturers' system components, including roll goods, mastics, primers, asphalt, sheet metal and adhesives must carry that manufacturer's label.



## South San Francisco Unified School District



Sections 07 00 00

Version 1, 2011.9.30

- All roof systems must meet Class A fire-resistive, FM Class 1 (including FM I-90), and UL Class A standards. It should be noted that when a roof is rated with a Class A Fire-Resistive Rating, it is the entire assembly that is rated, not just the roofing membrane. In addition, roofs shall be designed for wind exposures in accordance with CDC designations for specific building locations. Roofing system manufacturer shall submit a wind uplift calculation per ASCE 7-05 stamped by a California licensed structural engineer. Ref. CBC Chapter 15 1504.1.
- The architect shall design any new buildings, site structures, or landscaped areas to ensure that no unauthorized person is able to gain access to any roof by climbing trees, fences, hillsides, etc. The architect shall bring to the District's attention any such conditions at existing facilities.
- Roofing contractor qualifications: Minimum 5 years experience with the specified product.
- Contractor shall obtain Fire Department permits when using open flames and equipment fueled by propane tanks.
- The architect shall provide a dedicated staff member or professional construction administrator with roofing knowledge and experience to monitor the roofing installation as it progresses from beginning to end. A minimum of three site visits per week for a minimum of four hours per visit shall be required. The architect shall be responsible for providing a weekly written report to the District outlining the progress, location, quantities, and general conformance of the work with the contract documents. In addition, the roofing system manufacturer shall provide a technical inspector to perform a thorough inspection of the roof installation a minimum of three times a week during the course of construction to confirm compliance with the manufacturer's requirements.

### **Low-Slope Roofs (New Roofs and Roof Replacements)**

- Low-slope roofs on new buildings shall be sloped a minimum of 1/2" per foot (not 1/4" per foot) to a maximum of 3" per foot (3:12). Existing roofs with a slope of less than 1/4" per foot (2%) should have slope added to provide a minimum of 1/4" per foot slope wherever possible as part of any roofing replacement project. At concrete decks, apply a suitable cementitious material. At wood decks, apply new plywood over tapered sleepers and design crickets to ensure positive drainage to roof drains. Tapered rigid insulation may also be acceptable. The architect should show the layout of slopes, crickets, and drains, on the roof plans. Where modification of roof slopes is unfeasible or impractical, consider adding adhesive-applied gravel over the existing roof (white color for cool roofs).
- Where applicable to new buildings or new additions, parapets are preferred over simple gravel stop edges. Parapets shall be 12" (minimum) above the adjacent finished roof. At existing buildings, raise curbs and counter flashings to 8" min. above the finished roof



## South San Francisco Unified School District



Sections 07 00 00

Version 1, 2011.9.30

where possible. Extend underlayment over the top of the new curbs and parapets (under metal coping caps).

- Asphalt shall be Type IV Trumbull unless roofing assembly includes a proprietary asphalt. Provide, use, and maintain in good working order asphalt melting kettles equipped with afterburner-type emissions control devices for all roofing work. Emissions control devices used shall control kettle emissions during all loading, melting, pumping, standby, and skimming activities on site. Devices shall be constructed so as to prevent afterburner flames from entering the interior of the kettle or other areas where combustible atmospheres may be present.
- Walking pads are typically used at conditions where a high quantity of rooftop equipment or the potential need for frequent maintenance may indicate a need. Specify APOC, 3/4" thickness.
- For roofing replacement projects, remove all existing roofing to the structural deck. Overlays of existing roofing materials are not acceptable. Repair and/or patch existing deck where damaged or decayed.
- Partial re-roofing should be limited to emergency repairs. Any other proposed partial re-roofing projects shall be reviewed with SSFUSD Facilities Department and considered only where the existing roof to remain is in serviceable condition. When allowed, tie-ins between old and new roofing areas shall include complete area separations, with adequately detailed terminations and transitions, wherever possible.
- Viability of reusing existing mechanical devices, skylights, flashings, copings, and other sheet metal accessories, etc. shall be determined by the architect based on a visual inspection.
- The selection of a roofing system for a particular building must take into account a considerable variety of conditions. One system designed to accommodate a set of conditions present on a particular building will not necessarily serve as the best system for a building next door or in another part of the District. For example, a building with a roof deck of plywood sheathing over wood framing would not use the same system, but possibly the same material type, as a building with a concrete slab serving as the roof deck. A primary difference between the types of roofing systems is the substrate – nailable and non-nailable. In addition, roofing systems are classified differently for different performance levels within individual climatic zones. High-wind areas, such as will require roofing systems with specific properties to deal with the wind. Architects should consider an appropriate number of roofing systems in planning for the roofing application best suited to individual buildings. All quality roofing manufacturers have a variety of systems that are manufactured with qualities to address the types of conditions commonly encountered on a variety of buildings.



## South San Francisco Unified School District



Sections 07 00 00

Version 1, 2011.9.30

### Acceptable Low-Slope Roofing Manufacturers

- 2-Ply Modified Bitumen Roofing (SBS)
  - Flexbase 80, Stressply E FR Mineral and Pyramic by The Garland Company ([www.garlandco.com](http://www.garlandco.com))
  - Approved equal, if performance and quality equivalency can be evidenced.
- White Gravel System
  - WhiteStar by The Garland Company and Lucus Rock – FireWhite.
- Single-Ply Thermoplastic Roofing (PVC)
  - Solarbrite by Commercial Innovations ([www.commercialinnovations.com](http://www.commercialinnovations.com))
  - 
  - Approved equal, if performance and quality equivalency can be evidenced.
- Architects should follow NRCA guidelines and each manufacturer's published literature for determining the appropriate application of each individual product.

### High-Slope Roofs Asphalt Shingles

- Use on slopes 3:12 or greater.
- Use laminated fiberglass-reinforced asphalt composition dimensional shingles that comply with ASTM D3462. Provide minimum 30-year warranty.
- Specify shingles with copper oxide algae inhibiting granules.
- Nails: Galvanized, 6 per shingle in the field. Additional fasteners may be required at overhangs. Staples are not permitted.
- Installation shall withstand high wind conditions. Design for minimum 110 mph exposure. Shingles must be tested and labeled on the wrapper to conform to the following standards:
  - ASTM D3161, Class F at basic wind speed less than or equal to 130 mph
  - ASTM D6381 and UL 2390, Class G (or higher) at basic wind speed less than or equal to 120 mph
- Cool Roof: Initial Solar reflectance .25. Eligible for LEED credits.
- Acceptable High-Slope Roofing Manufacturers
  - Owens-Corning ([www.roofing.owenscorning.com](http://www.roofing.owenscorning.com))
  - Approved equal, if performance and quality equivalency can be evidenced.



## South San Francisco Unified School District



Sections 07 00 00

Version 1, 2011.9.30

### Sheet Metal Roofing

- Allowable on roofs with slopes of  $\frac{1}{4}$ : 12 or greater. Review proposed designs with less than 3:12 slope with District Facilities Department.
- The roofing material shall be 0.040" aluminum sheet metal with Kynar 500 baked epoxy finish for use in marine environments. Basis of design is Garland "R-Mer Loc Lx."
- Standing seam roofing system type shall be as follows:
  - For roof slopes less than  $1\frac{1}{2}$ " per foot (when allowed by District), roofing shall be structural standing seam (2-3/8" height min.). Garland "R-mer Span"
  - For roof slopes greater than  $1\frac{1}{2}$ " per foot (review with District when less than 3:12), roofing shall be snap lock style ( $1\frac{1}{2}$ " height min.) or structural standing seam (2-3/8" height min.). Garland "R-Mer Loc LX or "R-mer Span".
- Roofing underlayment: Commercial Innovations "Viking UDL Metal" or as recommended by metal roofing manufacturer under metal roof panels.
- Acceptable Sheet Metal Roof Manufacturers:
  - The Garland Company ([www.garlandco.com](http://www.garlandco.com))
  - Approved equal, if performance and quality equivalency can be evidenced.

### Sheet Metal Flashings and Trim

- Provide 0.040" aluminum with a Kynar 500 baked epoxy paint.
- Copings, Gutter and Edge Metal: 0.040" aluminum. Coping slope  $\frac{1}{2}$ " inch per foot minimum. No simple lap joints. Use butt plates or cover plates. ANSI-SPRI ES-1 tested per CBC Chapter 15, Section 1504.5, The Garland R-mer edge System.
- Corners are to be shop fabricated (no field fabrication).
- Lap joints against the weather.
- Lap metal edge flashings 4" under (into) the finished roof membrane.
- Galvanized sheet metal is to be etched with a muriatic acid wash (galvawash) and prime painted to prepare for finished painting.
- Provide 2-part counter flashings (snap-lock) at parapets to ease re-roofing. Fry Reglet products are recommended ([www.fryreglet.com](http://www.fryreglet.com)). Provide one part polyurethane caulk (Sikaflex 1A, Sonneborn NP-1 or approved) at counter flashings.
- Use round roof penetrations wherever possible with zinc cone jacks with stainless steel draw bands. Avoid pitch pockets (They are a maintenance problem). If used, provide sheet metal umbrellas. Another good alternative is to use the Garla-Flex by the Garland Company to flash around roof penetrations.



## South San Francisco Unified School District



Sections 07 00 00

Version 1, 2011.9.30

- Provide W.R. Grace Ice and Water Shield, Carlisle WIP- 300 HT, Vycor V40, or Polyken Foilastic 626-35 over the top of the parapets (under the sheet metal copings) if parapets are ventilated. Otherwise use 30 lb. felt over parapets (under copings).

### Roof Accessories

- Provide guardrails, removable screens, or glazing systems adequate to withstand required structural loads (as required by DSA) for fall protection at all skylights and roof edges.
- Project specifications shall require the contractor to perform 40 lb./s.f. load test on all skylights or as required by DSA.
- Screen openings cannot exceed 4"x 4". Refer to Title 8, California Code of Regulations, Subchapter 7, Group 1, Article 2, Section 3212.
- Ladders are to be installed where there is a difference of more than 3 feet between one roof level and the next. Ladders shall be aluminum and OSHA compliant. Alaco Ladders or equal.
- Roof hatches and roof access ladders shall have telescoping safety ladder posts. Roof hatch shall be all aluminum construction by Bilco or equal.

### Roof Drains

- All existing drains shall be cleared of debris and water-tested before work commences and both existing and new drains shall be water-tested after work is complete to ensure all drain lines are free-flowing.
- Provide sumps (24" x 24" x 2" deep minimum) at all new drains. Reinforce the bottom of the sump with a 0.029 soft zinc sheet. Solder joints and round corners (no sharp points) to avoid puncturing the overlaying membranes.
- Drains that do not have proper bolts or attachments, or lead and oakum joints, shall be replaced.
- Install overflow drains or overflow scupper adjacent to roof drains where missing. Building code requires engineer's calculation per CBC Chapter 15, Section 1503.4, of the adjacent drain line.
- Downspouts: G-90 galvanized schedule 40 pipe with 1/4 inch steel plate supports welded to pipe. Straps are acceptable. Galvanize after fabrication. All roof drains and overflows shall be routed to the outside face of the building. Downspouts shall have stainless steel wire bulb strainer at gutter openings. Provide at-grade cleanouts in all downspouts.



## South San Francisco Unified School District



Sections 07 00 00

Version 1, 2011.9.30

- Acceptable Roof Drain Manufacturers:
  - o Josam Co. ([www.josam.com](http://www.josam.com))
  - o Jay R. Smith Manufacturing Co. ([www.jrsmith.com](http://www.jrsmith.com))
  - o Zurn Industries Inc. ([www.zurn.com](http://www.zurn.com))

### Waterproofing

#### Door and Window Flashings

- Provide at new and replacement door and window frames- W.R. Grace Vycor V40; Perm-A-Barrier flashing, or equal.

#### Vapor Barriers

- Provide at new exterior framing- W.R. Grace Perm-A-Barrier; Dupont Tyvek CommercialWrap, or equal.

#### Fluid Applied Waterproofing

- Provide at foundations, elevator pits and other below grade applications- American Hydrotech, or equal.

#### Pedestrian Coatings

- Provide at exterior decks, balconies- Dura-walk by The Garland Company, [www.garlandco.com](http://www.garlandco.com) or equal

#### Sealants

- Elastomeric sealant/ adhesive- provide One part polyurethane caulk, Sikaflex 1A, Sonneborn NP-1 or equal.

### Insulation

#### **Rigid Roof Insulation**

- Match slope at existing construction, except as needed to re-slope for adequate drainage. Minimum slope for existing roofs should be ¼" per foot.
- Slope min. ½" per foot slope at new construction.
- The construction documents shall specify insulation that is appropriate to the selected roofing system and application method and that complies with the fire rating for the entire roofing assembly.
- Top layer: Use material recommended by roofing system manufacturer. Perlite board is generally not acceptable. When using wood fiber overlayment board (not suitable for use



## South San Francisco Unified School District



Sections 07 00 00

Version 1, 2011.9.30

with cold-applied roofing), specify ½” min. thickness coated high-density wood fiber. Acceptable wood fiber products include those manufactured by Blueridge-Celotex and Temple-Inland.

- Bottom layers: Polyisocyanurate (rigid foam) insulation, thickness to provide required R-value. Use tapered insulation, 25 PSI and fiberglass faced on both sides, to provide slope to drain min.
- Expanded polystyrene (EPS) is not allowed.

### Batt/ Blanket Roof Insulation

- Flexible, faced and unfaced blankets made of inorganic glass fibers, complying with ASTM C665, 01350 (CHPS) compliant, and with glass fiber portion classified as noncombustible when tested in accordance with ASTM C136.
- Existing Buildings: Insulate all open stud cavities when the finishes have been removed and the studs are exposed due to other work (example: insulate toilet room walls when plumbing work requires removal of the wall finish).

### Substitutes Allowed?

- Approved equal, if performance and quality equivalency can be evidenced prior to bid.

### Associated Design Standards and Construction Specifications

- NRCA Manual for Waterproofing and Roofing
- SMACMA Architectural Sheet Metal Manual

End of Document