

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. This section specifies rough carpentry, including all framing, sheathing, fasteners.

1.2 RELATED SECTIONS

- A. 07 22 16 – Roof Insulation.

1.3 QUALITY ASSURANCE

- A. Furnish materials complying with the following:
1. Softwood Lumber.
 - a. Graded in accordance with the latest edition of "Standard Grading Rules No. 17," WCLIB, or "Western Grading Rules," WWPA. Lumber grades specified below are taken from "Standard Grading Rules, No. 17." Equal grades from "Western Grading Rules" are acceptable. Furnish lumber bearing a recognized grading bureau mark or a "Certificate of Grade" may be substituted. Where a grade for Douglas Fir (DF) species is indicated, other species, if approved by the COR, may be supplied on an equal stress grade basis.
 2. Pressure Treatment.
 - a. Waterborne, conforming to AWPA C2, AWPA P5.
 3. Plywood.
 - a. Graded in accordance with APA PS 1-95. Furnish panels identifiable by a grade trademark of a recognized grading association. Index numbers listed (i.e. 24/0) may be larger but not smaller than shown.
 4. All materials and construction techniques shall meet applicable Local codes or the requirements herein, whichever is stricter.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Lumber.

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ROOFING REPLACEMENT PROJECT
SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT**

1. Furnish S4S lumber, unless otherwise shown on drawings. Furnish lumber with a moisture content of 19 percent or less for material 3 inches and less in nominal thickness, unless otherwise specified.
- B. Framing Members.
 1. Beams.
 - a. 4 inches and less in width: No.2, DF, S-dry.
 - b. 5 inches and wider: No. 1 DF.
 2. Joists and Stair Stringers.
 - a. No. 2, DF, S-dry.
 3. Rafters.
 - a. No. 2, DF, S-dry.
 4. Studs & Plates (2 x 4 and smaller): Stud or standard grade, DF, Larch, Hemlock, S-dry.
 5. Headers.
 - a. No. 2, DF, Larch, Hemlock, S-dry.
 - b. Studs and Plates (2 x 6 and larger): No. 2, DF, Larch, Hemlock, S-dry.
 - c. Blocking.
 - 1) Standard grade, DF, Larch, Hemlock, S-dry.
 6. Columns.
 - a. No. 1, DF.
- C. Exterior Sheathing.
 1. Roof Sheathing.
 - a. Plywood: ½" CDX exterior plywood, 24/0.
- D. Fasteners
 1. Hot-dipped galvanized steel fasteners
 2. Stainless steel fasteners when in contact with copper flashings and accessories.

PART 3 - EXECUTION

3.1 CONSTRUCTION

A. Framing.

1. Make joints in beam and girders over supports unless shown otherwise on the drawings.
2. Nail built-up girders from both sides with 16d nails at 30 inches on center staggered in 2 rows. Provide 2 nails at each end of each piece and each splice.
3. Set sills level and anchored on the foundation. Set in a full bed of Portland Cement mortar, if necessary to obtain full bearing. Provide flat washers on all anchor bolts.
4. Set joist with crown side up. Install solid blocking over supports. Provide a minimum of 1-1/2 inch bearing for each joists. Nail with two 16d nails at each bearing. Double joists under parallel partitions and at all openings.
5. Toenail rim joists to sill with 8d nails 16 on center.
6. Lap joists over girders 4 inches minimum. Nail with three 16d nails from each side.
7. Notching of joist will be allowed in the end 1/3 of the span only. Limit notching to 1/6 of the joist depth.
8. Set rafters with crown edge up. Cut birds-mouths to provide full bearing. Nail rafters to top plate with two 8d nails and to ceiling joists with three 16d or five 10d nails.
9. Fabricate trusses as shown on the drawings. Nail to top plate with four 10d nails. Install framing anchors where shown on the drawings.
10. Provide continuous length studs. Nail studs to top plate with four 8d toenails or two 16d end nails.
11. Install full length cripples at all openings. Nail cripples to studs with 16d nails at 24 inch on center. Toenail cripple to header with two 8d nails.
12. Space header material with plywood or surfaced lumber to equal the stud depth.
13. End nail studs to header with three 16d nails.
14. Do not splice columns. Cut ends square to provide full bearing. Nail columns top and bottom with four 16d toenails, or as shown on drawings.

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ROOFING REPLACEMENT PROJECT
SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT**

B. Exterior Sheathing.

1. Install roof sheathing at right angles to supports. Stagger end joints a minimum of 1 span. Nail with two 8d nails at each support.
2. Apply plywood roof sheathing with the face grain at right angles to supports. Stagger end joints. Nail with 8d nails 6 inch on center at edges and 12 inch on center at intermediate supports.

C. Exposed Hardware.

1. Provide rough hardware for the proper installation of work. Install hot-dipped galvanized hardware, nails, bolts, etc. at locations exposed to the weather.

END OF SECTION 06100

SECTION 07 01 50

PREPARATION FOR ROOF INSTALL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Removal of existing roofing system in preparation for new Roofing system(s).
- B. Salvaging, storing, and protecting existing work to remain or to be removed and re-installed.

1.02 RELATED REQUIREMENTS

- A. Section 07 55 55 – Modified Bitumen Roofing

1.03 PROJECT CONDITIONS

- A. Conform to applicable regulatory procedures when hazardous or contaminated materials are discovered.
- B. Schedule work to coincide with commencement of installation of new roofing system.
- C. Remove only existing roofing materials that can be replaced with new materials the same day.
- D. Coordinate the work with other affected mechanical and electrical work associated with roof penetrations.
- E. Do not disable or disrupt building fire or life safety systems without 10 (ten) days' prior written notice to Owner.
- F. Do not close or obstruct egress from any building exit or site exit.
- G. Conduct roof removal to minimize interference with adjacent and occupied building areas.
- H. Use all means necessary to protect existing objects, construction and plantings designated to remain. In the event of damage, make all repairs and replacements necessary for approval of Architect at no additional cost to the Owner.
- I. Protective measures: Provide all necessary safeguards, including warning signs and lights, barricades, and the like, for protection of the public, Contractor's employees and existing improvements during demolition. Prevent access of unauthorized persons to area of work
- J. Provide at least one person who shall be present at all times during execution of this portion of the work, be thoroughly familiar with the type of work being performed and the best methods for its execution and who shall direct all work performed under this Section.
- K. Control the use of water to prevent damage to the existing facilities to remain. Provide wet vacuum equipment where water, such as waste cooling water from concrete sawing or water used as dust emollient, is used adjacent to and in existing buildings.
- L. Cease operations immediately if structure appears to be in danger and notify Owner's rep. Do not resume operations until directed.

1.04 SCHEDULING

- A. Schedule work under the provisions of Section 01310.
- B. Schedule work to coincide with new construction.
- C. Coordinate preparation for roofing with other trades to assure the proper sequence, limits, methods and time of performance. Schedule work so as to impose a minimum of

hardship on the present operation of facilities and the performance of the work of other trades or contracts.

D. Describe removal procedures and schedule.

1.05 FIELD CONDITIONS

A. Do not remove existing roofing membrane when weather conditions threaten the integrity of the building contents or intended continued occupancy.

B. Maintain continuous temporary protection prior to and during installation of new roofing system.

PART 2 PRODUCTS

2.01 MATERIALS

A. Temporary Protection: Sheet polyethylene; provide weights and temporary fasteners to retain sheeting in position.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing roof surface is clear and ready for work of this section.

3.02 PREPARATION

A. Provide, erect, and maintain temporary barriers at locations required to prevent unauthorized access to area of work.

B. Inspect the area of work and verify locations of all items designated to be removed or preserved.

C. Do not begin work until temporary barricades, warning signs and other forms of protection are installed.

D. Erect and maintain weatherproof closures for exterior openings.

E. Erect and maintain temporary partitions to prevent spread of dust, odors, and noise to permit continued occupancy of adjacent buildings.

F. Protect existing equipment, materials and features that are not to be demolished or removed for re-installation.

G. Prevent movement of structure; provide bracing and shoring.

1. Be responsible for the adequacy and design of all temporary shoring and bracing systems.

H. Notify affected utility companies before starting work and comply with their requirements.

1. Mark location and termination of utilities.

2. Provide appropriate temporary signage including signage for exit or building egress.

I. Sweep roof surface clean of loose matter.

J. Remove loose refuse and dispose off site.

3.03 MATERIAL REMOVAL

A. Disconnect, cap, and identify designated utilities within removal areas.

B. Remove metal flashings as required.

C. Remove roofing membrane, shingles, perimeter base flashings, flashings around roof protrusions, pitch pans and pockets as required.

E. Repair existing wood deck surface to provide smooth working surface for new roof system.

F. Work not mentioned to be removed that interferes with new construction shall be cut to clean cut lines to provide for proper interface with new construction, or patching and repair, as required for scope of work indicated.

3.04 PROTECTION

- A. Provide temporary protective sheeting over uncovered deck surfaces.
- B. Turn sheeting up and over parapets and curbing. Retain sheeting in position with temporary fasteners.
- C. Provide for surface drainage from sheeting to existing drainage facilities.
- D. Do not permit traffic over unprotected or repaired deck surface.

3.05 SALVAGE

- A. Items indicated to be re-installed shall be removed carefully, cleaned and stored in a protected location on or off the site until re-installed.

3.06 PATCHING

- A. Patch materials to remain when damaged by this work. Finish materials and appearance of the patch or repair work shall match the existing contiguous materials and finishes in all respects and shall be approved by Owner.
- B. Where materials are removed oversize or in improper location, replace the excess removed material as instructed by Architect at no additional cost to the Owner.

3.07 RE-INSTALLATION

- A. Re-Install removed items as indicated on roof plans or details. Securely attach, provide watertight, weatherproof installation.

3.08 CLEAN-UP AND DISPOSAL

- A. Debris, waste, and removed materials, other than items to be salvaged, are Contractor's property for legal disposal off the site, as required by applicable Federal and State regulations. Continuously clean up and remove these items. Do not allow removed items to accumulate.
- B. Leave the site in a neat and orderly condition prepared for the work of other trades.

END OF SECTION

SECTION 07 22 16

ROOF INSULATION

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Roof insulation and installation.
 - 1. HCFC FREE "Green" Polyiso Rigid board type roof insulation(s) for thermal protection as part of roofing assemblies.

1.2 RELATED SECTIONS

- A. Section 07 0150 Preparation for Roof Replacement
- B. Section 06 51 00 Rough Carpentry for wood nailers, curbs, and blocking; and for wood-based, structural-use roof deck panels.
- C. Section 07 55 00 Modified Bitumen Roofing
- D. Section 07 62 00 Sheet Metal Flashing and Trim
- E. Sections specifying work related to or penetrating the roof.

1.3 REFERENCES

- A. ASTM A-167-94a Specification for Stainless and Heat-Resisting Chromium Nickel Steel Plate, Sheet and Strip
- B. ASTM A- 653 Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc - Iron Alloy-Coated (Galvanized) by the Hot-Dip Process
- C. ASTM B-29 Pig Lead
- D. ASTM B-32 Solder Metal
- E. ASTM C-165-95 Test Method for Measuring Compressive Properties of Thermal Insulation
- F. ASTM C-208-95 Specifications for Cellulosic Fiber Insulating Board
- G. ASTM C-209-92 Test Method for Cellulosic Fiber Insulating Board
- H. ASTM C 518 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- I. ASTM C-728-91 Specification for Perlite Thermal Insulation Board
- J. ASTM D-5 Test Method for Penetration of Bituminous Materials
- K. ASTM D-36 Test Method for Softening Point of Bitumen (Ring and Ball Apparatus)
- L. ASTM D-92 Test Method for Flash and Fire Pints by Cleveland Open Cup
- M. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- N. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.
- O. ASTM E 2114-01 - Standard Terminology for Sustainability Relative to the Performance of Buildings
- P. ASTM 2129 -01 - Standard Practice for Data Collection for Sustainability Assessment of Building Product
- Q. FM Factory Mutual System, Norwood, Massachusetts
- R. NRCA National Roofing Contractors Association, Chicago, IL
- S. SMACNA Sheet Metal and Air Conditioning Contractors National Association
- T. UL Underwriter's Laboratories, Inc., Northbrook, Illinois
- U. FS HH-I-1972 Insulation Board, Polyisocyanurate

V. WH Warnock Hersey International, Inc. Middleton, WI

1.4 DEFINITIONS

- A. HCFC FREE "Green" Polyiso Roof Board Insulation is defined as environmentally friendly, with Zero Global Warming, Zero Ozone Depletion (ODP) as in compliance with the US EPA requirements of January 1, 2003 requirement to eliminate production of HCFC 141b.
- B. LTTR (Long Term Thermal Resistance) is defined as using techniques from ASTM C1303, CAN/ULC S770 predicting a foam's R-Value that has been shown to be equivalent to the average performance of a permeably faced foam insulation product over 15 years. In Canada this method is used as the Design R-Value. This applies to ALL foam insulation products with blowing agents other than air, such as Polyiso, "Green" Polyiso, extruded polystyrene and polyurethane. The new method is based on consensus standards in the US and Canada. PIMA has reported this method as providing a better understanding of the thermal performance of foam.

1.5 SUBMITTALS

- A. See Section 01 33 00 - Submittals, for submittal procedures.
- B. Product Data: Manufacturer's specifications and installation instructions for each product specified.
- C. Provide approval letters from insulation manufacturer for use of their insulation within this particular roofing system type.
- D. Provide a sample of each insulation type.
- E. Shop Drawings: Indicate layout of insulation boards. Stagger joints
- F. Indicate complete installation details of tapered insulation system, including identification of each insulation block, sequence of installation, layout, drain locations, roof slopes, thicknesses, crickets and saddles.
- G. Include: Outline of roof, location of drains and scuppers, complete board layout of tapered insulation components, thickness and the average "R" value for the completed insulation system.
- H. Certifications: Submit all of the following:
 - 1. Roof manufacturer's certification that insulation fasteners furnished are acceptable to roof manufacturer.
 - 2. Roof manufacturer's certification that insulation furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.
 - 3. Wind uplift calculation, per CBC, Chapter 15, 1504 utilizing ASCE 7. Wind uplift shall be provided by the roofing system manufacturer. Calculation shall be signed and sealed by a CA licensed Structural II engineer.
 - 4. System Manufacturer's or insulation manufacturer's certification that HCFC FREE "Green" Polyiso materials meet Zero ODP (Ozone Depletion Potential) and Zero GWP (Global Warming Potential) specification requirements.

1.6 DESIGN REQUIREMENTS

- A. No ponding of water on roof, all runoff flows to drain.
- B. All roof insulation overlaid with cover board. No roofing installed over exposed insulation.

**PARKWAY HEIGHTS MIDDLE SCHOOL
ROOFING REPLACEMENT PROJECT
SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT**

1.7 PERFORMANCE REQUIREMENTS

- A. General: Fire Classification, ASTM E-108; Section specifies a roof system with an external fire rating. The descriptions given below are general descriptions. The insulation, recovery board, and all other components shall be included as required by the membrane manufacturer to provide a Factory Mutual Class 1A fire resistance rating or Listed by Underwriter's Laboratories or Warnock Hersey for external fire tests of ASTM - E - 108 Class A.
- B. Provide continuity of thermal barrier at building enclosure elements.
- C. Flame spread less than 25 when tested in accordance with ASTM E84.
- D. Smoke density less than 50 when tested in accordance with ASTM E84.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened packaging, with identifying tags or labels intact and legible.
- B. Coordinate scheduling for timely deliveries and prompt installation of materials.
- C. Store insulation and support system in a dry, protected area out of direct sunlight. If storage area is outdoors, store material off the ground and protected by a suitable waterproof cover.
- D. Remove insulation which is warped, broken or exposed from moisture from the site.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Handle and install insulation system only under conditions and temperatures recommended by the manufacturer.
- B. Coordinate insulation placement to assure that material can be covered promptly with roof. Do not leave insulation exposed overnight or to inclement weather.

1.10 WARRANTY

- A. Provide warranty coordinated with the requirements of other sections specifying roof products.

PART 2 – PRODUCTS

2.1 MANUFACTURER

- A. Acceptable Manufacturers:
 - 1. The Garland Company, www.Garlandco.com.
 - 2. Dow, www.dow.com.
 - 3. GAF, www.gaf.com.
- B. Substitutions: See Section 01 63 00 - Product Substitution Procedures.

2.2 MATERIALS

- A. Polyisocyanurate Roof Insulation: Provide thicknesses of insulation and slope as indicated. Provide combination of types and thicknesses to provide a complete system.
 - 1. Surface Burning Characteristics: Provide assembly with composite flame spread rating of 25 or less and smoke developed of 50 or less, as determined in accordance with ASTM E 84.
 - 2. Factory Tapered, closed cell polyisocyanurate foam.
 - a. R-Value: Minimum 30.
 - 3. Insulation board shall meet the following requirements:
 - a. UL, WH or FM listed under Roofing Systems

**PARKWAY HEIGHTS MIDDLE SCHOOL
ROOFING REPLACEMENT PROJECT
SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT**

- b. Federal Specification HH-I-1972, Class 1
 - c. Dimensional Stability ASTM D2126 2% max.
 - d. Compressive Strength ASTM D1621 25 psi min.
 - e. Vapor Permeability ASTM E-96 1 perm max.
 - f. Foam Core Density ASTM D1622 2.0 pcf min.
 - g. Water Absorption ASTM C209 <1 %
 - h. Flame Spread ASTM E 84, 25 max.
 - i. R-Factor HR per inch thickness ASTM C 518 (Design Value).
 - j. Tapered insulation: 1/8" slope as indicated on roof plan. 1/4" tapered insulation at drain sumps.
- B. Related Materials:
- 1. Fiber Cant and Tapered Edge Strips: Performed rigid insulation units of sizes/shapes indicated or as required to achieve configurations shown, of perlite or organic fiberboard:
- C. Insulation adhesive: Garland Insul-Lock HR or approved equal.
- D. Cover board insulation: 1/2" Densdeck Prime or approved equal.
- E. Fasteners:
- 1. Corrosion resistant screw fastener as recommended by roof membrane manufacturer.
 - 2. Factory Mutual Tested and Approved with 3 in. coated disc for 1-90 rating, length required to penetrate deck one inch.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify that roof framing system is complete and ready to receive insulation system. Do not proceed with installation until unsatisfactory conditions have been corrected.
- 1. Verify that work which penetrates roof deck has been completed.
 - 2. Verify that wood nailers are properly and securely installed.
 - 3. Examine surfaces for defects, rough spots, ridges, depressions, foreign material, moisture, and unevenness.
 - 4. Do not proceed until defects are corrected.
 - 5. Do not apply insulation until substrate is sufficiently dry, 12 percent moisture maximum, and ready to receive insulation and adhesive.
 - 6. Broom clean substrate immediately prior to application.
 - 7. Use additional insulation to fill depressions and low spots that would otherwise cause ponding water.

3.2 INSTALLATION

- A. General: Install roof insulation in strict accordance with manufacturer's instructions and approved shop drawings.
- B. Roofing insulation attachment:
- 1. Attachment shall be per roofing system manufacturer's wind uplift calculation.
 - 2. Install no more than 2" of thermal insulation as a single layer. Mechanically attach all base layers of thermal insulation on wood decks. All subsequent layers shall be installed with foam adhesive.
 - 2. Place boards in a method to maximize contact bedding. Notch out undersides of insulation where insulation directly covers structural fasteners which are attached to the roof deck. Make notch equal to the length, width, and depth of steel strap.

**PARKWAY HEIGHTS MIDDLE SCHOOL
ROOFING REPLACEMENT PROJECT
SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT**

3. Filler pieces of insulation require at least two fasteners per piece if size of insulation is less than four square feet.
4. Provide spacing pattern of fasteners manufacturer's recommendations to meet FM requirements. Placement of any fastener from edge of insulation board shall be a minimum of three inches, and a maximum of six inches.
5. Taper insulation starting 6' around drains, taper down to 1" at drains.
6. Install tapered crickets between drains as indicated on Roof Plan. Crickets to be min double the slope of the field to ensure proper drainage.

3.3 CLEANING AND PROTECTION

- A. Remove debris and cartons from roof deck. Protect finished work to ensure that insulation remains clean and dry, ready to receive roofing membrane.

END OF SECTION

SECTION 07 55 55

MODIFIED BITUMEN ROOFING

PART 1 - GENERAL

1.1 SCOPE OF WORK:

- A. Roof replacement.
 - 1. Remove all roofing to the structural deck.
 - 2. Mechanically attach insulation where indicated on ROOF PLAN and cover board insulation.
 - 3. Install base ply and base flashing.
 - 4. Install cap sheet and flashing sheet.
 - 5. Coat roof over occupied spaces or contiguous with roofs over occupied spaces.
 - 6. Over covered walkways apply flood and gravel.
 - 7. Install new edge metal.

1.2 RELATED SECTIONS:

- A. Section 07 01 50 – Preparation for Roof Install
- B. Section 07 22 16 – Roof Insulation
- C. Section 07 62 00 – Sheet Metal Flashing and Trim

1.3 REFERENCES:

- A. The editions of the American Society for Testing and Materials (ASTM) Standards referenced herein apply to the work only to the extent specified by the references thereto.

1.4 SUBMITTALS:

- A. Product Data: Submit certificates of compliance, manufacturer's specifications, installation instructions, and general recommendations for each roofing and insulation material required.
 - 1. Submit certificates of conformance, certified test reports, or other data indicating conformance of installation with the applicable reference standards.
- B. Certificates: Applicator shall provide letter certifying that work has been installed in accordance with specifications and manufacturer's written instructions.
- C. Warranty: sample of 30 year warranty.
- D. Wind uplift calculation per ASCE 7-22 stamped by the roofing system manufacturer's California licensed structural II engineer.

1.5 QUALITY ASSURANCE:

**PARKWAY HEIGHTS MIDDLE SCHOOL
ROOFING REPLACEMENT PROJECT
SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT**

- A. Manufacturer: Obtain primary roofing materials from a single manufacturer who specializes in this particular field of roofing and who has been so engaged, successfully, for a period of at least 10 years immediately prior to this contract. Provide secondary materials as recommended by manufacturer of primary materials.
- B. Applicator: A firm with not less than 5 years of successful experience in installation of roofing systems similar to those required for this project and who is acceptable to or licensed by manufacturer of primary roofing materials.
- C. UL Listing: Provide labeled materials which have been tested and listed by UL in "Building Materials Directory" for application indicated, with UL or Warnoch Hersey Class A fire rated system for roof slopes indicated.
- D. Pre-installation Conference: Before installing roofing system, conduct conference at Project site to comply with requirements of Section 01312. Notify participants at least 5 working days before conference.
 - 1. Meet with Owner; Architect; roofing installer, materials manufacturer, the sheet metal installer, the roofing accessories installer, the mechanical and electrical sub-contractors, Contractor, testing laboratory in attendance.
 - 2. Review methods and procedures related to roofing installation, including manufacturers written instructions.
 - 3. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 4. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing.
 - 5. Review governing regulations and requirements for insurance, certificates, and inspection and testing.
 - 6. Review temporary protection requirements for roofing system during and after installation.
 - 7. Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.

1.6 DELIVERY, STORAGE AND HANDLING:

- A. Deliver materials to the site in their original unbroken containers or packages bearing the manufacturers name, and brand designation. In addition, liquid materials shall bear the date of manufacture and manufacturers recommended shelf life.
- B. Store materials at the site in a dry location, raised above the ground and protected from physical damage. Store materials, other than sheet roofing, at temperatures between 40 degrees F and 80 degrees F. Do not store materials past their shelf life.
- C. If materials are stored on the roof, distribute the load so as not to exceed the designed live load limits of the roof construction.

1.7 PROJECT CONDITIONS:

- A. Do not install the insulation and sheet roofing during high winds; wet, damp or foggy weather or when there is moisture or visible dampness on the substrate surface.

1.8 WARRANTY:

- A. Manufacturer's warranty shall be a total NDL system labor and material warranty including all built up bituminous roofing.
 - 1. This warranty shall provide the Owner with a single source of liability by guaranteeing the waterproofing system (metal coping, modified bitumen roofing and metal edge system) against leaks for a period of 30 years.
 - 2. Warranty shall cover up to ASCE 7-22 calculated wind pressures.
- B. Installer's warranty: Installer's warranty shall cover the work in this section, including all components of the roofing system such as roof membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards.
 - 1. Warranty Period: Three years from date of substantial completion.

1.9 MANUFACTURER INSPECTIONS

- A. Minimum of three times per week.
- B. Weekly inspection reports, including photos, by the roofing system manufacturer's technical representative to the Owner and the Architect during installation.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Use basic products of one manufacturer throughout. Materials which are not available from the basic manufacturer shall be approved by him. In all cases, materials and application shall be in accordance with the requirements of this specification.
- B. Basis of Design: The Garland Company, Inc.; 3800 E. 91st St., Cleveland, OH 44105. ASD. Phone: 209-401-2529. Fax: 216-641-0633. Web Site: www.garlandco.com.
- C. The products specified are intended and the Standard of Quality for the products required for this project. If other products are proposed the bidder must disclose in the bid the manufacturer and the products that they intend to use on the Project. If no manufacturer and products are listed, the bid may be accepted only with the use of products specified.
 - 1. Bidder will not be allowed to change materials after the bid opening date.

2. If alternate products are included in the bid, the products must be equal to or exceed the products specified. Supporting technical data shall be submitted to the Architect/Owner for approval prior to acceptance.
3. In making a request for substitution, the bidder/roofing contractor represents that it has:
 - a. Personally investigated the proposed product or method, and determined that it is equal or superior in all respects to that specified.
 - b. Will provide the same guarantee for substitution as for the product and method specified.
 - c. Will waive all claims for additional cost related to substitution, which consequently become apparent.
 - d. Will coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.
 - e. Cost data is complete and includes all related cost under his/her contract or other contracts, which may be affected by the substitution.
 - f. Will reimburse the Owner for all redesign cost by the Architect for accommodation of the substitution.
4. Architect/Owner reserves the right to be the final authority on the acceptance or rejection of any or all bids, proposed alternate roofing systems or materials that has met ALL specified requirement criteria.
5. Failure to submit substitution package, or any portion thereof requested will result in immediate disqualification and consideration for that particular contractor's request for manufacturer substitution.

D. MODIFIED BITUMENOUS MATERIALS:

1. Base ply and base flashing: One ply of Stressbase 80 Sheet bonded to the prepared substrate.
2. Modified Membrane
 - a. Cap sheet at coated roofs: Stressply Plus FR Mineral.
 - b. Cap sheet at graveled roofs: Stressply Plus FR Mineral.
 - c. Flashing: STRESSPLY Plus FR Mineral; 185 mil SBS (Styrene-Butylene-Styrene) mineral surfaced, rubber modified roofing membrane incorporating recycled rubber, fire retardant characteristics and reinforced with a fiberglass and polyester composite scrim.
 - d. Performance Characteristics:
Tensile Strength (ASTM D5147)
2 in./min. @ 73.4 ± 3.6°F MD 310 lbf/in CMD 310 lbf/in
Tear Strength (ASTM D5147)

2 in/min. @ 73.4 ± 3.6°F MD 500 lbf CMD 500 lbf
Elongation at Maximum Tensile (ASTM D5147)
2 in/min. @ 73.4 ± 3.6°F MD 3.5% CMD 3.5%
Title 24 approved for low slope.

3. All flashings will be Stressbase 80 base flashing ply covered by an additional layer of mineral surfaced modified bitumen membrane.

E. BITUMINOUS MATERIALS

1. Asphalt Roofing Mastic: V.O.C. compliant, ASTM D-2822, Type II.

2.2 AUXILIARY MATERIALS:

- A. Sealant: exterior polyurethane as approved by roofing system manufacturer.
- B. Pipe flashing: Greenweld from Viking Products Group.
- C. Gravel: 5/8" White Spar.
- D. Membrane/Gravel adhesive: Green-Lock Plus, low VOC adhesive.
 1. VOC Content: <50 g/L
 2. Non-Volatile(ASTM D 4586): 100%
- E. Roof coating: White Elastomeric Roof Coating: Pyramic Plus LO; Energy Star approved white acrylic roof coating:
 1. Weight/Gallon 12 lbs./gal. (1.44 g/cm³)
 2. Non-Volatile % (ASTM D 1644) 66 min
 3. Reflectance 81%

PART 3 - INSTALLATION

3.1 GENERAL INSTALLATION REQUIREMENTS:

- A. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing modified bitumen roofing system.
- B. Protect other work from spillage of modified bitumen roofing materials, and prevent liquid materials from entering or clogging drains and conductors. Replace or restore other work damaged by installations of modified bituminous roofing system work.
- C. 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 one ply of type II felt set in mastic and with joints and edges sealed with roofing cement. Remove cut offs immediately before resuming work.

**PARKWAY HEIGHTS MIDDLE SCHOOL
ROOFING REPLACEMENT PROJECT
SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT**

- D. Substrate Joint Penetrations: Prevent bitumen from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.
 - E. 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.
 - F. Fume recovery system: shall be in operation at all times when kettle is lit.
- 3.2 INSULATION INSTALLATION
- A. See Section 07 22 00.
- 3.3 BASE PLY INSTALLATION
- A. Base ply: Install one base ply shingled uniformly to achieve one ply over the entire prepared substrate. Shingle in direction of slope of roof to shed water on each area of roof. Fish mouths should be cut and patched.
 - B. Lap ply sheet ends eight 8 inches. Stagger end laps twelve 12 inches minimum.
 - C. Extend ply two inches beyond top edges of cants at wall and roof projections and equipment bases. Seal top of flashing at end of day, every day.
 - D. Install base flashing ply to all perimeter and projection details.
 - E. Prime existing roof and lap onto existing roof a minimum of 6". Set membrane in mastic.
- 3.4 MEMBRANE APPLICATION:
- A. Solidly bond the modified membrane to the base layer.
 - B. Exercise care during application to eliminate air entrapment under the membrane.
 - C. Apply pressure to all seams to ensure that the laps are solidly bonded to substrate with mastic.
 - D. Install subsequent rolls of modified membrane across the roof as above with a minimum of four inch side laps and eight 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.
 - E. Extend membrane 2" beyond top edge of all cants in full adhesion of the specified adhesive as shown on the drawings. Seal top of ply at end of day, every day.
 - F. Prime existing roof and lap onto existing roof a minimum of 12".
- 3.6 FLASHING MEMBRANE INSTALLATION (GENERAL)
- A. All curb, wall and parapet flashings shall be sealed with an application of mastic and mesh on a daily basis. No condition should exist that will permit moisture entering behind, around, or under the roof or flashing membrane.

**PARKWAY HEIGHTS MIDDLE SCHOOL
ROOFING REPLACEMENT PROJECT
SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT**

- B. Prepare all walls, penetrations and expansion joints to be flashed and where shown on the drawings, with asphalt primer at the rate of one gallon per 100 square feet. Allow primer to dry tack free.
- C. The modified membrane will be used as the flashing membrane and will be adhered to an underlying base flashing ply per manufacturer's recommendations and nailed off 8" O.C. at all vertical surfaces. Seal top of flashing at end of day every day.
- D. The entire sheet of flashing membrane must be solidly adhered to the substrate.
- E. Seal all vertical laps of flashing membrane with a three course application of Flashing Bond and fiberglass mesh.
- F. Counter flashing, cap flashings, expansion joints, and similar work to be coordinated with modified bitumen roofing work are specified in other sections.
- G. Roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices to be coordinated with modified bituminous roof system work are in other sections.

3.7 APPLICATION OF SURFACING

- A. Gravel surfacing: apply GreenLock at 5 gallons per sq and broadcast gravel at 400 lbs per sq.
- B. Roof and all flashing coating:
 - 1. Apply Pyramic at 1 gal per sq. per coat. Apply two coats.

3.8 CLEAN UP

- A. Clean up work soiled in the performance of work under this section. Restore or replace surfaces which have been damaged by work under this section.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING & TRIM

PART 1 — GENERAL

1.1 SCOPE OF WORK

- A. Provide all metal flashings necessary to complete a water tight installation of the specified roofing system.
- B. Provide factory coated sheet metal flashings at the following locations:
 - 1. Flat and raised edge details.
 - 2. Gutters, straps, leaders and downspouts.
 - 3. Any area where sheet metal contacts membrane unless otherwise noted in the detail drawings.
- C. Manufactured Products:
 - 1. Coping, reglets, counterflashings: Factory coated aluminum.

1.2 PROJECT CONDITIONS

- A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.
- B. Provide separator sheet between dissimilar metals in contact.

1.3 QUALITY ASSURANCE:

- A. Installer: All work of this Section must be performed by a licensed sheet metal contractor with five years of successful experience with installation of sheet metal flashing and trim similar in type and scope to project requirements.
- B. Quality Standard: Fabricate and install sheet metal work in accordance with Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA) "Architectural Sheet Metal Manual", unless specifically indicated otherwise.

1.4 TECHNICAL SUBMITTALS

- A. Submittal requirements: Contractor shall highlight anything in the submittal package that conflicts with or changes specifications or drawings. Include a reason for the change. Any submittals that alter existing specifications or drawings shall be approved by the engineer and owner prior to implementation.
- B. The following submittals are to be made in conjunction with any other submittal requirements set forth in the bid documents.

- C. ANSI SPRI ES-1 approval for edge metal and coping system.
- D. The contractor shall submit the following upon request of the owner or engineer:
 - 1. Manufacturer specification data sheets. Submit for the following products:
 - a. Specified sheet metal.
 - b. Sealants.
 - c. Fasteners.
 - 2. Manufacturer literature describing the installation procedure of the specified system.
 - 3. Shop drawings of any details that may be different than the details included in these specifications. This includes manufacturer detail drawings that may be different. All flashing detail designs shall be approved by the Owner.
 - 4. Material safety data sheets.

PART 2 — PRODUCTS

2.1 COATED SHEET METAL

- A. Owner's Representative shall approve all colors.

2.2 METAL FLASHING

- A. Sealant: One part urethane, Tuff Stuff by The Garland Company or approved equal.
Asbestos Content 0% EPA/600/R-93/116
- B. Edge metal and gutters: Shop fabricated metal components provided by the roofing system manufacturer. Performa Edge by IMETCO or approved equal.
 - 1. 0.050" thickness aluminum, 3105-H14 alloy, smooth as per ASTM B209-96.
 - 2. Two coat coil applied, baked-on full-strength (70% resin) fluorocarbon coating system (polyvinylidene fluoride, PVF2).
 - a. Color: from manufacturer's standard color range.
 - 3. ANSI SPRI ES-1 approved.
- C. Coping and flashing system: R-mer Force by The Garland Company or approved equal.
 - 1. 0.050" thickness aluminum, 3105-H14 alloy, smooth as per ASTM B209-96.
 - 2. Two coat coil applied, baked-on full-strength (70% resin) fluorocarbon coating system (polyvinylidene fluoride, PVF2).
 - a. Color: from manufacturer's standard color range.
 - 3. ANSI SPRI ES-1 approved.

- C. Gutter accessories:
 - 1. Gutter hangers and downspout straps: 1/8" aluminum.
 - 2. Wire bulb strainers: stainless steel.
 - 3. Gutter guards: Green Gutter Screens, www.greengutterscreens.com
 - a. Aluminum.
- D. Downspouts, leaders and elbows:
 - 1. Light gauge downspouts, leaders and elbows: 0.040" aluminum. Preprimed.
 - 2. Heavy gauge downspouts: Schedule 40 galvanized steel, primed and painted.

PART 3 — EXECUTION

3.1 EXAMINATION:

- A. Examine substrates and conditions under which products of this section are to be installed and verify that work may properly commence. Do not proceed with the Work until unsatisfactory conditions have been fully resolved.
- B. Verify that nailers, blocking, and other attachment provisions for sheet metal work are properly located and securely fastened to resist effects of wind and thermal stresses.

3.2 PREPARATION:

- A. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- B. Verify that surfaces to receive sheet metal are smooth, clean of all foreign matter, and have no water present in any form.

3.3 ROOF DRAINAGE SHEET METAL FABRICATION

- A. Gutters:
 - 1. Downspouts: 0.050" aluminum w/ 10' off grade to be painted Schedule 40 aluminum pipe
 - 2. Supports: welded 1/8" T-bracket.
 - 3. Finish where visible: etch, prime and paint to match wall. Touch up in field.
- B. Leaders, elbows and straps (double thickness): Fabricate dimensions required. Fabricate from the following materials.
 - 1. Aluminum: 0.050"
 - a. IMETCO – Performa Edge or equal.
 - b. Finish: Kynar coated finish.

3.5 SHEET STEEL INSTALLATION:

- A. Sheet metal work shall be executed in a first-class, workmanlike manner in accordance with standard shop practices. Comply with sheet metal manufacturer's installation methods and recommendations in the SMACNA "Architectural Sheet Metal Manual".
- B. The sheet metal work shall be accurately formed to dimensions and shapes detailed or required. Broken shapes shall finish with true, straight, sharp lines, and angles; and where intersecting, shall be coped to a precise fit and be securely soldered and scraped smooth. Lock seam work shall be made flat and true to line, sweated full of solder.
- C. All sheet work shall be so formed and installed as to provide suitable allowance for expansion and contraction without causing undue stresses in any part of the completed work and shall finish water and weather tight throughout. Provide movement joints at maximum spacing of ten feet. No joints within 2 feet of corner or intersection.
- D. Mechanically fasten and solder all joints, splices and transitions that are not designed for expansion. Fasten metal by solid riveting or forming double lock seams. Seal by continuous soldering.
- E. Galvanic Action Protection: Isolate different metal types from each other to prevent galvanic action.
- F. Use elastomeric sealant where necessary to make a watertight installation.
- G. Form a ½ - inch hem on the underside of all exposed edges.
- H. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer. The gage thickness shall be as recommended by SMACNA for application but in no case less than gage of metal being secured.
- I. Soldered Joints:
 - 1. Clean surfaces to be soldered, removing oils and foreign matter.
 - 2. Prein edges of sheets to be soldered to a width of 1-1/2 inches.
 - 3. Soldering shall be done with well heated soldering irons. Do not use torches for soldering.
 - 4. Heat surfaces to receive solder and flow solder into joint. Fill joint completely.
 - 5. Completely remove all flux spatter from exposed surfaces with a solution of washing soda in water.

3.6 INSPECTION:

Before completing the work, owner shall carefully examine, and if necessary, test all sheet metal work and equipment specified herein, and Contractor shall make all repairs to the work if damaged, leaving it in a condition satisfactory of the owner.

3.7 CLEAN UP:

All debris and/or rubbish resulting from the operations of this Work shall be cleaned up and removed from the work site as the work progresses. Contractor shall be responsible for removal of refuse by all subcontractors working under its direction.

END OF SECTION

SECTION 07 72 00

ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Rooftop supports
 - 2. Coping Cap
 - 3. Passive Vents
- B. Related Sections:
 - 1. Section 075555 – Modified Bitumen Roofing for coordination with roof cants, sealants and flashings.
 - 2. Section 076200 - Sheet Metal Flashing and Trim for premanufactured- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.

1.3 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

1.4 ACTION 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: For roof accessories. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.
- B. Warranty information

1.6 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof,

- weathertight, secure, and noncorrosive installation.
- B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

- A. Aluminum Extrusions and Tubes: ASTM B 221 , manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.
- B. Stainless-Steel Sheet and Shapes: ASTM A 240/A 240M or ASTM A 666, Type 304.
- C. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.
- D. Steel Tube: ASTM A 500, round tube.
- E. Galvanized-Steel Tube: ASTM A 500, round tube, hot-dip galvanized according to ASTM A 123/A 123M.
- F. Steel Pipe: ASTM A 53/A 53M, galvanized min. G-90.

2.2 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- C. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide non-removable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
 - 1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
 - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- D. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.
- G. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.3 PASSIVE VENTS

- A. Manufacturer: GreenHeck – Greenheck.com or approved equal
 - 1. Model: FGR, aluminum mill finish

2.4 ROOF HATCH

- A. Manufacturer: Bilco-Tyman Group
 - 1. Model: Type S Aluminum, mill finish, 30" x 36" or as verified in field.
- B. Other acceptable manufacturer: Babcock-Davis or approved equal.
- C. Construction
 - 1. Cover and frame: 11 gauge aluminum
 - 2. Cover: brakeformed, with 1" concealed fiberglass insulation, fully welded at corners
 - 3. Curb: 12" in height with integral cap flashing, 1" fiberboard insulation, fully welded at corners
 - 4. Gasket: extruded EPDM rubber gasket adhered to cover
 - 5. Hinges: heavy-duty pintle hinge with Type 316 stainless steel hinge pins
 - 6. Latch: slam latch with interior and exterior turn handles and interior padlock hasp
 - 7. Lift assistance: Compression spring operators in telescopic tube with automatic hold-open arm with grip handle release.
 - 8. Misc. Hardware: aluminum or stainless steel.

2.5 ROOF DRAIN

- A. Manufacturer: Zurn or approved equal. Duracoated cast iron drain and strainer assembly.
 - 1. Classroom Building: Z100

2.6 NON-PENETRATING ROOFTOP ASSEMBLIES

- A. Manufacturers - Non-Penetrating Rooftop Assemblies:
 - 1. RoofTop Accessories: www.keycurb.com.
 - 2. Dura Block: www.dura-block.com
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Non-Penetrating Rooftop Assemblies: Manufacturer-engineered and factory-fabricated, with pedestal bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly.
 - 1. Design Loadings and Configurations: As required by applicable codes.
 - 2. Support Spacing and Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 - 3. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
 - 4. Resilient Components: Molded 100 percent recycled rubber or HDPE plastic.
 - 5. Hardware, Bolts, Nuts, and Washers: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A153/A153M.
 - 6. Rollers: Non Binding Heavy Duty Plastic.
- C. Pipe Supports: Provide resilient base pipe curb attachment fixtures complying with MSS SP-58 and as indicated. If no supports are shown, provide types necessary to support items indicated, in compliance with referenced standard, to suit conditions shown.
 - 1. Attachment/Support Fixtures: As recommended by manufacturer, same type as

- indicated for equivalent indoor hangers and supports; corrosion resistant material.
- 2. Provide vibration isolation and cushioning with minimum shock transmission to the substrate, allowing free movement, free of pipe tension or binding.
- D. Duct Supports: KeyCurb Adjustable Support Model (AS). Supports piping and HVAC ducts. Two (2) KeyCurbs Model KS with cross bar to suspend hangers or adjustable rollers placed on top of cross bar.
- E. Conduit and Cable Tray Supports:
 - 1. Type: KeyCurb Strut, Model (KS) Curb with a framing channel for strut clamps.
 - 2. Type: KeyCurb Strut Adjustable, Model (KSA) Curb with a framing channel and adjustable threaded rods for strut clamps.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions.
 - 1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
 - 2. Anchor roof accessories securely in place so they are capable of resisting

END OF SECTION