Addendum No. 1

Bid No. 23/24-06MO, Unit Cost Pricing for Roofing
June 7, 2024

Addendum No. 1 forms a part of the Agreement and modifies the original bid documents. It is intended that all work affected by the following modifications shall conform to related provisions and general conditions of the Agreement, of the original bid documents. ALL OTHER PROVISIONS of the original bid documents shall remain unchanged. **Modify the following items wherever appearing in any portion of the bid documents**. ***Acknowledge receipt of Addendum No. I on the Bid Form. Failure to do so may subject bidder to disqualification.***

Response to Contractors' Questions

1.1 Question: *"Please confirm if you need the **complete** "*Appendix A-Specifications" (attached) submitted with our bid or just the listed **"ATTACHMENTS"** under Appendix A shown below."*

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***Items must be completed, signed, and submitted as part of the bid. If required contract documents are not submitted the bidder will be declared non- responsive.**

+Items which successful bidder must submit after the award.

Answer: It is not necessary to submit the entire Appendix A – Specifications, however, bidder must submit the Renewal Clause, Hypothetical Project Basis of Award A through F, Bid Form A, Bid Form B, and Manufacturer's Checklist and Questionnaire. The attached document referenced in question 1.1 is attached hereto following question/answer no. 1.4.

1.2 Question: *"Please also confirm if this project will have any DVBE requirements the successful bidder must meet."*

Answer: As indicated within Article 72 of the General Conditions, the Contractor is either to meet the DVBE goals and requirements for participation, or at minimum, make a good faith effort to do so.

1.3 Question: *"I have a question regarding Question (21) on the Information Required of Bidder document. If I am understanding correctly this is asking for current, on-going projects. Yet is it asking for a Completion Date. Can you please clarify?"*

Answer: Please specify the projected "Completion Date" for the project(s) currently under contract with your firm.

1.4 Question: *"For ease of inputting the pricing on Bid Form A, please consider providing the bidders an Excel file in lieu of the PDF format within the bid documents."*

Answer: An excel format is not available.

APPENDIX A

Specifications

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SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Attached GENERAL CONDITIONS, BID FORM, forms a component part of this section.

1.2 SUMMARY OF WORK

A. All Roof Sections:

1. All roof drains should be water tested to assure that they are clean and free of blockages both before and after roof project.
2. Clean up all debris and damage (including but not limited to asphalt and mastic) done to grounds, building and roof top (if any).

1.3 PROTECTION

A. The contractor shall use every available precaution to provide for the safety of the property owner, visitors to the site, and all connected with the work under the Contract.

B. All existing facilities both above and below ground shall be protected and maintained free of damage. Existing facilities shall remain operating during the period of construction unless otherwise permitted. All access roadways must remain open to traffic unless otherwise permitted.

C. Barricades shall be erected to fence off all construction areas from operations personnel.

D. Safety Requirements:

1. All application, material handling, and associated equipment shall conform to and be operated in conformance with OSHA safety requirements.

2. Comply with federal, state, and local and owner fire and safety requirements.

3. Advise owner whenever work is expected to be hazardous to owner employees and/or operations.

4. Maintain a crewman as a floor guard whenever roof decking is being repaired or replaced.

5. Maintain proper fire extinguisher within easy access whenever power tools, roofing kettles, and torches are being used. A MINIMUM OF A 2 HOUR FIRE WATCH SHALL BE STRICTLY ADHERED TO WHENEVER PROPANE TORCHES ARE IN USE.

6. ALL SAFETY REQUIREMENTS OF THE BUILDING OWNER MUST BE FOLLOWED. NO EXCEPTIONS WILL BE PERMITTED. SAFETY ORIENTATION MEETING
REQUIRED PRIOR TO PERFORMING ANY WORK.

1.4 HOUSEKEEPING

A. Keep materials neat and orderly.

B. Remove scrap, waste and debris from the project area each day.

C. Maintenance of clean conditions while work is in progress and cleanup when work is completed shall be in strict accordance with the “General Conditions” of this contract.

D. Fire protection during construction.

E. Follow all requirements established by the building owner.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Related Sections:

1. Notice to Bidders
2. Instructions to Bidders

1.2 SUBMITTAL PROCEDURES

A. Coordination of submittals

1. Prior to each submittal, carefully review and coordinate all aspects of each item being submitted.

2. Verify that each item and the submittal for it conform in ALL respects with the specified requirements.

3. By affixing the Contractor's signature or approval stamp to each submittal, he/she certifies that this coordination has been performed.

B. Substitutions

1. The Contract is based on the standards of quality established in the Contract Documents. Use of any materials or methods other than those specified will require the proper submittal information outlined in paragraph 1.3 of this section. These submittals must be received a minimum of ten (10) days prior to the bid opening and be pre-approved in written addenda before bids are accepted by the building owner.

2. Do not substitute materials, equipment, or methods unless such substitution has been specifically approved by addenda for this Work by the Owner prior to receipt of bids.

3. Building owner reserves the right to final authority on acceptance or rejection of any substitute.

4. Request for substitutions will be accepted from prime bidders only. Requests for substitutions from parties not bidding on the project as a primary contractor will not be considered.

1.3 SUBMITTAL DOCUMENTS FOR SUBSTITUTION

A. All proposed material substitutions must submit the following documentation with their submittals ten (10) days prior to the bid due date.

1. A list of (3) jobs of similar size where the proposed alternate materials have been used, under similar conditions as specified.

2. Accredited testing laboratory certificate verifying physical performance attributes of materials meet specifications.

3. Copy of roofing supplier's warranty which meets all requirements of the specified warranty according to Section 01740 and each specific applicable specification section.

4. Product samples of the smallest standard packaged size of any material being submitted as an equal.

5. Individual product identification, including manufacturer's literature and MSDS sheets.

6. Letter from the material supplier signed by a corporate officer, on company stationary, confirming that all bidding documents have been approved, that the company will provide a manufacturer's representative that is a full time employee of their company that will be on site three days per week during installation of any and all products, and meets the requirements for suitability, and that the specified warranty shall be provided upon satisfactory completion of the project.

7. One manufacturer must be able to warranty all products being specified, please provide a notarized letter from an officer of the manufacturing company that includes a list of all products included under their warranties.

8. Verify material supplier is a financially stable organization with the ability to protect the building Owner from both product liability and warranty claims relating to roofing that might arise during the course of the warranty period. It is the intent of the building Owner to establish requirements that will protect him/her, be fair to all suppliers and ensure that requirements are in line with the exposure of the supplier.

9. Provide the address, size (square footage), and number manufacturing employees, and number of years their factory or factories has been owned or leased.

10. Provide corporate financial statements showing the company's current financial status. An asset to liability ration of 3:1 is required by the warranting roofing manufacturer.

11. Provide all information listed in the "Manufacture's Checklist and Questionnaire"

12. In addition, any proposed substitute materials or methods must also be accompanied by the following documentation:

    a. A complete specification of the proposed substitute. If, after review, the substitute is found to be acceptable, copies will be provided to each bidder who has picked up the original specification by a written addenda.

    b. Written explanation of why substitutions should be considered is required.

13. Manufacturer's inspection reports:

    a. **Daily** reports to owner from full time material manufacturer's employee. The reports will include pictures of the days progress made by the contractor and a detailed written report as to the work performed that day.

    b. Roofing manufacturer's inspector must have a minimum of 5 years experience with said roofing manufacturer and be an employee of the manufacturer

warranting the roof system. A signed affidavit should be submitted as to the hire date of said employee of roofing manufacturer.

c. The roofing manufacturer will provide an annual inspection of the roof system with a detailed report outlining the inspection. The report will notify the owner of any routine housekeeping such as cleaning of the drains, storm damage, etc.

END OF SECTION

SECTION 1500

TEMPORARY FACILITIES & CONTROLS

PART 1 GENERAL

1.1 RELATED SECTIONS

A. Drawing and Section 1 – General Information and Section 2 – Contract Terms and other sections of Division 1 apply to this Section.

1.2 TEMPORARY ELECTRICITY – DESCRIPTION OF REQUIREMENTS

A. Cost: By Owner, connect to Owner's existing power service. Do not disrupt Owner's use of service. Owner will pay cost of energy used. Exercise measures to conserve energy.

B. Complement existing power service capacity and characteristics as required.

C. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Each trade shall provide flexible power cords as required.

1.3 TELEPHONE SERVICE

A. Cell phone usage by the Contractors should be utilized. Emergency phone usage may be permitted by school district.

1.4 TEMPORARY WATER SERVICE

A. Connect to existing water source for construction operations at time of project mobilization.

B. SCHOOL DISTRICT will pay cost of water used. Exercise measures to conserve water.

C. Drinking water is to be provided by the Contractors via containers, tap-dispenser, etc. including paper cup supplies.

1.5 TEMPORARY SANITARY FACILITIES

A. Provide and maintain a minimum of one (1) sanitary facility and enclosure. Existing facility use is not permitted. Provide at time of project mobilization. Location to be approved by SCHOOL DISTRICT.

1.6 PARKING

A. Arrange for surface parking areas to accommodate construction personnel with SCHOOL DISTRICT.

1.7 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, materials, prior to Substantial Completion inspection.

B. Clean and repair damage caused by installation or used of temporary work.

C. Restore existing and permanent facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01740

WARRANTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and other Division 1 Specification sections, apply to work of this section.

B. Related Sections

1. Section 01300 - Submittals

1.02 WARRANTY

A. The modified bitumen roofs (torch, cold process, self adhering, and hot asphalt), and standing seam metal roofs will all receive a 30 year No Dollar Limit Labor and Material warranty that is non-prorated. Tile and Shingle roof systems will receive a 10 year warranty from the underlayment manufacturer. Urethane roof restoration systems will receive a 15 year warranty. Wall panel system will receive a 10 year warranty.

1. The warranty shall cover all insulation and sheet metal flashings.

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2. There will be no additional charges for the warranty inspections or fees for warranty extensions.

3. Warranty shall cover all labor and materials, be non-prorated, and have no dollar limit

B. The material manufacturer will provide a free annual inspection for the duration of the warranty.

C. The warranty shall cover all roof related components installed under this specification and shall not be limited to only those materials supplied by the material supplier issuing the warranty.

D. Specifically - The warranty submitted by the manufacturer of record will cover:

1. All labor.

2. Materials by the manufacturer of record.

3. Materials by others.

E. The contractor shall issue to the material supplier a 2 year labor warranty upon completion of the roof and acceptance by the material supplier's representative and the owner.

1.03 MAINTENANCE REQUIREMENTS (by owner)

A. Clean all drains, gutters and down spouts.

1.04 THE MANUFACTURER OF RECORD

A. Will not charge for any warranty problem inspections.

B. Provide an annual inspection of the roof system at the request of the building owner.

END OF SECTION

SECTION 07410
METAL ROOF PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Standing seam metal roofing system.

B. Standing seam metal roofing accessories.

C. Metal roofing accessories.

1.2 REFERENCES

A. ASTM E 283 - Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

B. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

C. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

D. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.

E. ASTM E 1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.

F. ASTM E 2140 - Standard Test Method for Water Penetration of Metal Roof Panel Systems by Static Water Pressure Head.

G. AAMA 501.1 - Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure.

H. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

I. FM 4470 Approval Standard for Class 1 Panel Roofs.

J. FM 4471 - Class 1 Panel Roof; Factory Mutual Research Corporation.

K. UL 263 - Fire Tests of Building Constructions and Materials.

L. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies.

M. UL 790 - Standard Test Methods for Fire Tests of Roof Coverings.

N. UL 1897 - Uplift Test for Roof Covering Systems.

O. ICC-ES AC166 - Test Procedure for Wind Driven Rain Resistance of Metal Roof Coverings.

P. SMACNA - Architectural Sheet Metal Manual.

Q. National Coil Coating Association (NCCA)

R. NRCA - The NRCA Roofing and Waterproofing Manual.

1.3 DESIGN / PERFORMANCE REQUIREMENTS

A. Standing Seam Roofing System: R-Mer Loc
1. Thermal Expansion and Contraction:
a. Completed metal roofing and flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.
b. Design temperature differential shall be not less than 200 degrees F.
c. Interface between panel and clip shall provide for unlimited thermal movement in each direction along the longitudinal direction.
d. Location of metal roofing rigid connector shall be at roof ridge unless otherwise approved by the Architect. Metal ridge connector may require design as per job conditions by specified manufacturer.
e. ASTM E 1592: Capacity shall be determined using pleated airbag method in accordance with ASTM E 1592, testing of sheet metal roof panels. Allowable safe working loads shall be determined by dividing the ultimate test load by the safety factor specified above.
2. Uniform Positive Load Capacity.
a. Installed roof system shall be capable of resisting the following positive uniform roof loads: Roof Live Load of 20 psf;
b. Installed roof system shall carry positive uniform design loads with a maximum system deflection of L/180 as measured at the rib (web) of the panel.
3. Underwriters' Laboratories, Inc., (UL):
a. Underwriters' Laboratories, Inc., (UL) fire resistance P ratings for roof assemblies: If applicable, panel system shall be approved for use in an appropriate Construction Assembly, as defined by UL 263.
b. Underwriters' Laboratories, Inc., (UL) Class A fire rating per UL 790.
4. ASTM E 1680: Static pressure air infiltration (roof panels):
a. Pressure Leakage Rate
1) 1.57 PSF 0.0054 cfm/sq.ft.
2) 6.24 PSF 0.0054 cfm/sq.ft.
3) 20.0 PSF 0.0027 cfm/sq.ft.
5. ASTM E 1646: Static pressure water infiltration (roof panels):
a. Pressure Result:
1) 5 Gal/Hr per S.F. and Static No Leakage
2) Pressure of 20.0 Psf. for 15 minutes
6. Capacities for gauge, span or loading other than those tested may be determined by interpolation of test results within the range of test data. Extrapolation for conditions outside test range is not acceptable.
7. Submit third party validation of environmental claims, prepared UL Environment, for all metal roof panels containing recycled content and/or bio based content.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Submit product data, test reports, and certifications in accordance with quality assurance and performance requirements specified herein.

C. Design Loads: Submit manufacturer's minimum design load calculations according to ASCE 7, Method 2 for Components and Cladding. In no case shall the design loads be taken to be less than those specified herein.

D. Dead Load Evaluation: Provide documentation from a licensed structural engineer of a

structural evaluation of the roof structure and it's suitability for the new imposed roofing loads.

E. Shop Drawings: Prepared specifically for this project; showing dimensions of metal roofing and accessories, fastening details and connections and interface with other products.

F. LEED Submittals: Provide documentation of how the requirements of Credit will be met:
   1. List of proposed materials with recycled content. Indicate post-consumer recycled content and pre-consumer recycled content for each product having recycled content.
   2. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.

G. Selection Samples: For each finish product specified, two complete sets of samples representing manufacturer's full range of available colors and textures.

H. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and textures.

I. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

J. Closeout Submittals:
   1. Provide manufacturer's maintenance instructions that include recommendations for periodic checking and maintenance of installed roof system.
   2. Provide executed copy of manufacturer's warranty.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall have in place a documented, standardized quality control program such as ISO-9001 approval.

B. Installer Qualifications: Certified and approved installer of the sheet metal roofing manufacturer.

1.6 PRE-INSTALLATION CONFERENCE

A. Convene a pre-roofing conference approximately two weeks before scheduled commencement of roofing system installation and associated work.

B. Require attendance of installers of deck or substrate construction to receive roofing, installers of rooftop units and other work in and around roofing which must precede or follow roofing work including mechanical work, Architect, Owner, roofing system manufacturer's representative.

C. Objectives include:
   1. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.
   2. Tour representative areas of roofing substrates, inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work.
   3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
   4. Review roofing system requirements, Drawings, Specifications and other Contract Documents.
   5. Review and finalize schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
   6. Review required inspection, testing, certifying procedures.
   7. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing.

8. Record conference including decisions and agreements reached. Furnish a copy of records to each party attending.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
   1. Store materials above ground, on skids.
   2. Protect material with waterproof covering and allow sufficient ventilation to prevent condensation buildup or moisture entrapment on the materials.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. Warranty:
   1. 30 year limited watertight warranty for roofs over a 3:12 slope.
   2. 20 year limited watertight warranty for roofs with a 1:5 to 3:12 slope.
   3. Provide installers 2 year warranty covering roofing system installation and water-tightness.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Garland Company or District pre-approved equal. Local contact: Steve Lampman 949-322-1770

2.2 STANDING SEAM METAL ROOFING

A. R-Mer Loc: Panel with 1-3/4 inch high standing seam with 3/8-inch high clearance between panel and substrate.
   1. Width of Panel:
      a. 16 inches.
   2. Seam Height: 1-3/4 inch.
   3. Slope: Open Purlins, Slopes down to 3:12.
   4. Slope: Solid Substrate, no framing components, Slopes down to 1-1/2 :12.
   5. Panel Clips: Minimum 18 gauge, galvanized steel or stainless steel. Two-piece clips are unacceptable.
   6. Passes:
      a. ASTM E 1592
      b. ASTM E 1680
      c. ASTM E 1646
      d. Class A Fire Rating, UL-790.
      e. UL (Class 90) 580.
   7. Panel material:
      a. Aluminum, 3105-H14 alloy, smooth as per ASTM B 209, .040 inch thickness.
   8. Flashing and flat stock material: Fabricate in profiles indicated on Drawings of same material, thickness, and finish as roof system, unless indicated otherwise.
   9. Coated Finish:

a. Exposed surfaces for coated panels:
1) Two coat coil applied, baked-on full-strength (70% resin) fluorocarbon coating system (polyvinylidene fluoride, PVF2), applied by manufacturer's approved applicator.
b. Unexposed surfaces for coated panels shall be baked-on polyester coating with .20 to .30 dry film thickness (TDF).
10. Accessory Components:
a. Gable anchor clips shall be minimum 18 gauge, galvanized steel or stainless steel.
b. Fasteners:
1) Concealed fasteners: Corrosion resistant steel fasteners (zinc plated or equal) designed to meet structural loading requirements. Provide #14 as minimum fastener size.
2) Exposed fasteners: Series 410 stainless steel fasteners or one-eighth (1/8) inch diameter stainless steel waterproof rivets. All exposed fasteners shall be factory painted to match the color of the standing seam panels.
c. Closures: Factory precut closed cell foam meeting ASTM D 1056 or ASTM D 3575, with metal trim matching panels when used at hip, ridge, jamb, and rake.
d. Provide all miscellaneous accessories for complete installation.

2.3 STANDING SEAM METAL ROOFING ACCESSORIES

A. Underlayment:
1. R-Mer Seal, self adhesive membrane, installed in accordance with manufacturer's recommendations.

B. Sealant:
1. Concealed Applications: Non-Curing Butyl Sealant - Schnee-Morehead, Inc. SM5430 Acryl-R, or equal.
2. Exposed Applications: UV Resistant Tripolymer Sealant - Geocel Corporation, 2300 Tripolymer Sealant, or equal.

2.4 METAL ROOFING ACCESSORIES

A. R-Mer SS Sheet Stock: High gloss, factory painted aluminum
1. Material and Thickness:
a. 0.040 inch aluminum
2. Color: Standard Colors

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive metal roofing. Notify the Architect in writing of any defective conditions encountered. Starting of work shall constitute acceptance of such conditions.

B. Structural Deck Substrate:
1. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves, or projections, and properly sloped.
2. Verify deck is dry and joints are solidly supported and fastened.
3. Verify wood nailers are installed and correctly located. Do not use pressure-treated wood containing salt-based preservatives or materials corrosive to steel.

C. Structural Framing Substrate:
1. Verify primary and secondary framing members are installed and fastened, properly aligned and sloped.

2. Verify damaged shop coatings are repaired with touch up paint.

D. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets are in place, and nailing strips located.

E. Correct defective conditions before beginning work.

3.2 INSTALLATION

A. Install in conformance with the NRCA Roofing and Waterproofing Manual and Manufacturers installation requirements.

B. Form panel shape as indicated on Drawings, accurate in size, square, and free from distortion or defects.

C. Install underlayment and eave protection sheet underlayment as recommended by the Manufacturer.

D. Install all panels continuous from ridge to eave. Transverse seams are not permitted.

E. Panel lengths that exceed maximum shipping lengths shall be field rolled on equipment owned by the panel manufacturer. Seam sealant must be factory applied.

F. Exposed fasteners, screws and/or roof mastic are unacceptable and will be rejected. System configuration only allows for exposed fasteners at panel overlap, if required, and at trim details in accordance with the Manufacturer's requirements.

G. Where not otherwise indicated conform to SMACNA details including flashings and trim.

H. Install sealants where indicated to clean dry surfaces only without skips or voids..

I. Install metal edge treatment in accordance with the manufacturer's instructions and the approved shop drawings.

J. Install metal roofing accessories in accordance with the manufacturer's instructions and the approved shop drawings.

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07411
STRUCTURAL METAL ROOF PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Standing seam metal roofing system.

B. Standing seam metal roofing accessories.

C. Metal roofing accessories.

1.2 REFERENCES

A. ASTM E 283 - Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

B. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

C. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

D. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.

E. ASTM E 1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.

F. ASTM E 2140 - Standard Test Method for Water Penetration of Metal Roof Panel Systems by Static Water Pressure Head.

G. AAMA 501.1 - Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure.

H. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

I. FM 4470 Approval Standard for Class 1 Panel Roofs.

J. FM 4471 - Class 1 Panel Roof; Factory Mutual Research Corporation.

K. UL 263 - Fire Tests of Building Constructions and Materials.

L. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies.

M. UL 790 - Standard Test Methods for Fire Tests of Roof Coverings.

N. UL 1897 - Uplift Test for Roof Covering Systems.

O. ICC-ES AC166 - Test Procedure for Wind Driven Rain Resistance of Metal Roof Coverings.

P. SMACNA - Architectural Sheet Metal Manual.

Q. National Coil Coating Association (NCCA)

R. NRCA - The NRCA Roofing and Waterproofing Manual.

1.3 DESIGN / PERFORMANCE REQUIREMENTS

A. Standing Seam Roofing System: R-Mer Span
1. Thermal Expansion and Contraction:
a. Completed metal roofing and flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.
b. Design temperature differential shall be not less then 200 degrees F.
c. Interface between panel and clip shall provide for unlimited thermal movement in each direction along the longitudinal direction.
d. Location of metal roofing rigid connector shall be at roof ridge unless otherwise approved by the Project Architect. Metal ridge connector may require design as per job conditions by specified manufacturer.
e. ASTM E 1592: Capacity shall be determined using pleated airbag method in accordance with ASTM E 1592, testing of sheet metal roof panels. Allowable safe working loads shall be determined by dividing the ultimate test load by the safety factor specified above.
f. Underwriters' Laboratories, Inc., (UL), wind uplift resistance classification: Roof assembly shall be classified as Class 1-90, as defined by UL 580
g. FM 4471: Submit test report for negative wind uplift pressures no less than that specified. Roof system must have approval over the substrate specified.
2. Uniform Positive Load Capacity.
a. Installed roof system shall be capable of resisting the following positive uniform roof loads: Roof Live Load of 20 psf; Roof Snow Load of ___ psf.
b. Dead Load: Loading of the roof structure, due to tear off of existing, and/or installation of new roofing materials shall not exceed the present loading due to weight of the existing roofing system.
c. Installed roof system shall carry positive uniform design loads with a maximum system deflection of L/180 as measured at the rib (web) of the panel.
3. Underwriters' Laboratories, Inc., (UL):
a. Underwriters' Laboratories, Inc., (UL) fire resistance P ratings for roof assemblies: If applicable, panel system shall be approved for use in an appropriate Construction Assembly, as defined by UL 263.
b. Underwriters' Laboratories, Inc., (UL) Class A fire rating per UL 790.
4. ASTM E 283: Static pressure air infiltration (doors, windows, curtain walls):
a. Pressure Leakage Rate
1) 1.57 PSF 0.0007 cfm/sq.ft.
2) 6.24 PSF 0.0002 cfm/sq.ft.
3) 20.0 PSF 0.0036 cfm/sq.ft.
5. ASTM E 331: Static pressure water infiltration (doors, windows, curtain walls):
a. Pressure Result:
1) 5 Gal. /Hr. per S.F. and Static No Leakage
2) Pressure of 20.0 Psf. for 15 minutes
6. ASTM E 1646: Static pressure water infiltration (roof panels):
a. Pressure Result:
1) 5 Gal. /Hr. per S.F. and Static No Leakage
2) Pressure of 20.0 Psf for 15 minutes
7. Capacities for gauge, span or loading other than those tested may be determined by interpolation of test results within the range of test data. Extrapolations for conditions outside test range are not acceptable.
8. Water penetration (dynamic pressure): No water penetration, other than condensation, when exposed to dynamic rain and 70 mph wind velocities for not less than five minutes duration, when tested in accord with principles of AAMA 501.1.

9. Wind and wind driven rain resistance: No water penetration or panel movement when exposed to 110 mph wind velocities when tested in accordance with TAS 100.
10. Installed roof system assembly shall show that it can resist the calculated roof pressure in accordance with the test results of TAS 125.
11. Water penetration in low slope applications: No water penetration or panel movement when subject to 6 inch head of water for 6 hours when tested in accordance with the ASTM E 2140 and when subject to 6 inch head of water for 7 days when tested in accordance with the TAS 114 appendix G.
12. Submit third party validation of environmental claims, prepared UL Environment, for all metal roof panels containing recycled content and/or bio based content.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Submit product data, test reports, and certifications in accordance with quality assurance and performance requirements specified herein.

C. Design Loads: Submit manufacturer's minimum design load calculations according to ASCE 7, Method 2 for Components and Cladding. In no case shall the design loads be taken to be less than those specified herein.

D. Shop Drawings: Prepared specifically for this project; showing dimensions of metal roofing and accessories, fastening details and connections and interface with other products.

E. LEED Submittals: Provide documentation of how the requirements of Credit will be met:
1. List of proposed materials with recycled content. Indicate post-consumer recycled content and pre-consumer recycled content for each product having recycled content.
2. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.

F. Selection Samples: For each finish product specified, two complete sets of samples representing manufacturer's full range of available colors and textures.

G. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and textures.

H. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

I. Closeout Submittals:
1. Provide manufacturer's maintenance instructions that include recommendations for periodic checking and maintenance of installed roof system.
2. Provide executed copy of manufacturer's warranty.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall have in place a documented, standardized quality control program such as ISO-9001 approval.

B. Installer Qualifications: Certified and approved installer of the sheet metal roofing manufacturer.

1.6 PRE-INSTALLATION CONFERENCE

A. Convene a pre-roofing conference approximately two weeks before scheduled commencement of roofing system installation and associated work.

B. Require attendance of installers of deck or substrate construction to receive roofing,

installers of rooftop units and other work in and around roofing which must precede or follow roofing work including mechanical work, Architect, Owner, roofing system manufacturer's representative.

C. Objectives include:
   1. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.
   2. Tour representative areas of roofing substrates, inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work.
   3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
   4. Review roofing system requirements, Drawings, Specifications and other Contract Documents.
   5. Review and finalize schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
   6. Review required inspection, testing, certifying procedures.
   7. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing.
   8. Record conference including decisions and agreements reached. Furnish a copy of records to each party attending.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
   1. Store materials above ground, on skids.
   2. Protect material with waterproof covering and allow sufficient ventilation to prevent condensation buildup or moisture entrapment on the materials.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. Warranty:
   1. 30 year, no dollar limit, warranty.
   2. Provide installers 2 year warranty covering roofing system installation and water-tightness.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Garland Company or District pre-approved equal. Local contact: Steve Lampman 949-322-1770

2.2 STANDING SEAM METAL ROOFING

A. R-Mer Span:
   1. Width of Standing T-Seam Panel: 1 inch T-seam.
      a. 16 inches.

2. Standing Seam: 2-3/8 inch tall mechanically seamed with factory installed hot melt sealant in-seam cap. Panel/Cap is configured with a total of 4 layers of metal surrounding anchor clip.
3. Panel Profile: Provided with minimum 1-1/2 inches wide elevated mesa's every 2 inches on center continuous throughout panel.
   a. Slope: Open Purlins or Solid Substrate down to 1/4:12.
4. Panel material:
   a. Aluminum, 3105-H14 alloy, smooth as per ASTM B 209, .040 inch thickness.
5. Flashing and flat stock material: Fabricate in profiles indicated on Drawings of same material, thickness, and finish as roof system, unless indicated otherwise.
6. Coated Finish:
   a. Exposed surfaces for coated panels:
      1) Two coat coil applied, baked-on full-strength (70% resin) fluorocarbon coating system (polyvinylidene fluoride, PVF2), applied by manufacturer's approved applicator.
7. Accessory Components:
   a. Anchor Clips:
      1) Concealed Standard Anchor Clips: Clips 16 gauge stainless steel, alloy 316L, 1 piece clip with projecting legs for additional panel alignment and provision for unlimited thermal movement in each direction along the longitudinal dimension.
   b. Gable anchor clips for:
      1) Standing Seam style.
         a) Stainless steel, alloy 316L, minimum thickness: 16 gauge.
   c. Fasteners:
      1) Concealed fasteners: Corrosion resistant steel fasteners (zinc plated, stainless steel or equal) designed to meet structural loading requirements.
      2) Exposed fasteners: Series 410 stainless steel fasteners or 1/8 inch diameter stainless steel waterproof rivets. All exposed fasteners shall be factory painted to match the color of the standing seam panels.
   d. Closures: Factory precut closed cell foam meeting ASTM D 1056 or ASTM D 3575, enclosed in metal channel matching panels when used at hip, ridge, rake, and jamb.
   e. Provide all miscellaneous accessories for complete installation.

2.3 STANDING SEAM METAL ROOFING ACCESSORIES

A. Underlayment:
   1. R-Mer Seal, self adhesive membrane, installed in accordance with manufacturer's recommendations.

2.4 METAL ROOFING ACCESSORIES

A. R-Mer SS Sheet Stock: High gloss, factory painted aluminum
   1. Material and Thickness:
      a. 0.040 inch aluminum
   2. Color: Standard Colors

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive metal roofing. Notify the Architect in writing of any defective conditions encountered. Starting of work shall constitute acceptance of such conditions.

B. Structural Deck Substrate:

1. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves, or projections, and properly sloped.
2. Verify deck is dry and joints are solidly supported and fastened.
3. Verify wood nailers are installed and correctly located. Do not use pressure-treated wood containing salt-based preservatives or materials corrosive to steel.

C. Structural Framing Substrate:
1. Verify primary and secondary framing members are installed and fastened, properly aligned and sloped.
2. Verify damaged shop coatings are repaired with touch up paint.

D. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets are in place, and nailing strips located.

E. Correct defective conditions before beginning work.

3.2 INSTALLATION

A. Install in conformance with the NRCA Roofing and Waterproofing Manual and Manufacturers installation requirements.

B. Form panel shape as indicated on Drawings, accurate in size, square, and free from distortion or defects.

C. Install underlayment and eave protection sheet underlayment as recommended by the Manufacturer.

D. Install all panels continuous from ridge to eave. Transverse seams are not permitted.

E. Panel lengths that exceed maximum shipping lengths shall be field rolled on equipment owned by the panel manufacturer. Seam sealant must be factory applied.

F. Exposed fasteners, screws and/or roof mastic are unacceptable and will be rejected. System configuration only allows for exposed fasteners at panel overlap, if required, and at trim details in accordance with the Manufacturer's requirements.

G. Where not otherwise indicated conform to SMACNA details including flashings and trim.

H. Install sealants where indicated to clean dry surfaces only without skips or voids..

I. Install metal edge treatment in accordance with the manufacturer's instructions and the approved shop drawings.

J. Install metal roofing accessories in accordance with the manufacturer's instructions and the approved shop drawings.

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07421

METAL WALL PANELS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes pre-formed flat seam wall panel system complete with anchor clips, fasteners, flashing, and trim.

1.3 REFERENCES

A. American Iron and Steel Institute (AISI):
   1. Specification for the Design of Cold-Formed Steel Structural Members.
   2. American Society for Testing and Materials (ASTM): B.
   3. ASTM A240 Specification for Heat Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels: C.
   4. ASTM A792 Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
   5. ASTM A875 Specification for Steel Sheet, Zinc-5% Aluminum Alloy-Coated by the Hot-Dip Process.
   6. ASTM B209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate
   7. ASTM B370 Specification for Copper and Sheet and Strip for Building Construction
   8. ASTM E283 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
   9. ASTM E331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Air Pressure Differences
   10. ASTM E331 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference

B. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
   1. Architectural Sheet Metal Manual

1.4 SUBMITTALS FOR REVIEW

A. Shop Drawings: Show wall panels (and roofing system, if applicable) with flashings and accessories in elevations, sections and details. Include metal thickness and finishes, panel lengths, joining details, anchorage details, flashings and special fabrication provisions for termination and penetrations. Indicate relationships with adjacent and interfacing work. Indicate fastener types and spacing; and provide fastener pullout values. Shop drawings must be completed by the wall panel manufacturer's engineering department. Any and/or all changes recommended by the successful bidder must be approved by the manufacturer in writing prior to submittal.

B. Product Data: Include manufacturer's detailed material and system description, concealed anchor clips, sealant and closure installation instructions, and finish specifications. Indicate fastener types and spacing; and required fastener pullout values.

C. Samples: Provide full-size samples of the following materials and system components. Samples shall be of identical material type, thickness, panel width, and material grade/alloy as the system specified for this project.
   1. Submit sample of panel section, at least 4" long x full panel width showing panel profile and also a sample of color selected.
   2. Submit sample of foam closure strips to fit inside and outside specified panel profile.
   3. Submit sample of panel fasteners.

D. Specimen Warranty: Provide an unexecuted copy of the warranty specified for this Project, identifying the terms and conditions required of the Manufacturer and the Owner.

E. Any material submitted as equal to the specified material must be accompanied by a report signed and sealed by a professional engineer licensed in the state in which the installation is to take place. This report shall show that the submitted equal meets the Design and Performance criteria in this specification. Substitution requests submitted without licensed engineer approval will be rejected for non-conformance.

1.5 SUBMITTALS FOR INFORMATION

A. Design and Test Reports: Provide the following certified test reports from an independent testing laboratory:
   1. Independent laboratory testing report for system design load and seam integrity.
   2. A letter from an officer of the manufacturing company certifying that the materials furnished for this project are the same as represented in tests and supporting data.
   3. Manufacturer's verifications that the panels are factory roll formed.
   4. ASTM E283 Test results must clearly demonstrate compliance with the performance requirements specified in article 1.9 ASTM E331 Test Report.
   5. ASTM E330 Test results must clearly demonstrate compliance with the performance requirements specified in article 1.9.
   6. ASTM E331 Test results must clearly demonstrate compliance with the performance requirements specified in article 1.9.

B. Mill production reports certifying that the metal thicknesses are within allowable tolerances of the nominal or minimum thickness or gauge specified.

C. Design Loads: Submit copy of manufacturer's minimum design load calculations according to ASCE 7, Method 2 for Components and Cladding. In no case shall the design loads be taken to be less than those detailed in Design and Performance Criteria article.

D. Qualification Data for Wall System Installer: Refer to Quality Assurance Article below.

E. Certification of work progress inspection frequency: Refer to Quality Assurance Article below.

F. Pre-installation Conference Proceedings: Refer to Quality Assurance Article below.

G. Test Reports: Submit third party validation of environmental claims, prepared by UL Environment, for all metal wall panels containing recycled content and/or bio based content.

1.6 CONTRACT CLOSEOUT SUBMITTALS

A. General: Comply with Requirements of Division 01 Section Closeout Submittals.

B. Special Project Warranty: Provide specified warranty for the Project, executed by the authorized agent of the Manufacturer.

C. Wall Panel Maintenance Instructions: Provide a manual of manufacturer's recommendations for maintenance of installed systems.

D. Insurance Certification: Assist Owner in preparation and submittal of wall installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on wall panel system installation and associated work.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Engage an Installer who has completed the Manufacturer's Approved Contractor course and is currently certified for the installation of the specified system.

B. If required, fabricator/installer shall submit work experience and evidence of adequate financial Responsibility. The Owner's representative reserves the right to inspect fabrication facilities in determining qualifications.

C. Source Limitations: Obtain all components of the wall panel system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the Manufacturer.
   1. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.
   2. Manufacturer shall have direct authority and control over all fabrication of steel components as well as the raw materials used in their fabrication.

D. Source Quality Control: Manufacturer shall have in place a documented, standardized quality control program such as ISO-9001 approval.

E. Engage the Manufacturer's Field Representative to conduct required periodic inspections of work in progress as described herein and shall furnish written documentation of all such inspections.

F. Manufacturer shall provide the Owner project with a written statement that they will provide a site inspection three days per week that confirms that the project is being constructed as specified, by an experienced, full time employee of the company.

G. Alternate Manufacturers: The following manufacturer criteria must be submitted. Alternate systems will not be considered for approval unless each of these items has been submitted for review at least 10 business days prior to bid opening.
   1. Submit each item listed in article 1.4 (A through E) for evaluation of the proposed system.
   2. Tests shall have been made for identical systems within the ranges of specified performance criteria.
   3. Empirical calculations for wall performance shall only be acceptable for positive loads.

4. A list of a minimum of five (5) jobs where the proposed alternate material was used under similar conditions. The reference list shall include date of project, size of project, project address, and telephone number of architect/owner contact.
5. A financial statement demonstrating a minimum of a 3:1 ratio of assets to liabilities.
6. A written statement from the manufacturer stating that they will provide the building owner with a daily site inspection for a minimum of one (1) hour per day by an experienced, full time employee of the company.
7. A written statement from the manufacturer stating that they will provide the engineer of record with a daily site inspection by an experienced full time employee of the company.
8. A written statement from a corporate officer of the manufacturing company stating that he or she has reviewed the specifications and confirms that the proposed system meets or exceeds all performance requirements listed as well as meets the panel size, gauge, weight, clip design, sealant design, uplift pressures and height of the vertical seam.
9. A copy of manufacturer's warranty.
10. Proof that the manufacturer has been in business for a minimum number of years equal to the warranty period required for this project.

1.8 PRE-INSTALLATION CONFERENCE

A. Convene a pre-installation conference approximately two (2) weeks before scheduled commencement of system installation and associated work.

B. Require attendance of installer of each component of associated work which must precede or follow wall panel work (including mechanical or electrical work if any), Architect, Owner, system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, testing agencies and governing authorities.

C. Objectives of conference to include:
1. Review foreseeable methods and procedures related to work, including set up and mobilization areas for stored material and work area.
2. Tour representative areas of building, inspect and discuss condition of substrates, penetrations and other preparatory work performed by others.
3. Review structural loading limitations of wall framing and inspect for unacceptable variations in planarity.
4. Review system requirements (drawings, specifications and other contract documents).
5. Review required submittals both completed and yet to be completed.
6. Review and finalize construction schedule related to work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
7. Review required inspection, testing, certifying and material usage accounting procedures.
8. Review weather and forecasted weather conditions and procedures for unfavorable conditions, including possibility of temporary wall protection (if not mandatory requirement).
9. Record discussion of conference including decisions and agreements (or disagreements) reached. 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.
10. Review notification procedures for weather or non-working days.

D. The Owner's Representative will be designate one of the conference participants to record the proceedings and promptly distribute them to the participants for record.

E. The intent of the conference is to resolve issues affecting the installation and performance of wall panel work. Do not proceed with work until such issues are resolved the satisfaction of the Owner and Engineer of Record. This shall not be construed as interference with the progress of Work on the part of the Owner or Engineer of Record.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Manufacturer's Responsibilities:
1. All panels shall be shipped from the manufacturer with a strippable film or similar packaging material separating the individual panels to minimize flexing, stressing, scratching or otherwise damaging the material during transit to the job.
2. Fully cover steel with tarpaulins or similar protective cover during transit to prevent dirt and debris from coming in contact with the finished goods.

B. Installer's Responsibilities:
1. Stack pre-finished materials to prevent twisting, bending, abrasion and denting and elevate one end to facilitate moisture run-off.
2. Unload wall panels using a boom or crane, supporting the panels in at least two locations during lifting, and never lift more than three panels at a time.
3. Protect moisture-sensitive materials and water-based from the weather.
4. Inspect materials upon delivery. Reject and remove physically damaged or marred material from project site.

1.10 PROJECT CONDITIONS

A. Determine that work of other trades will not hamper or conflict with necessary fabrication and storage and protection requirements for wall panel system.
1. Protection:
a. Protect completed work from subsequent construction operations. Comply with Manufacturer's recommendations.
b. Do not encumber the site with stored materials or equipment.
c. Do not support wall-mounted equipment directly on the wall panel system.

B. Ascertain that work of other trades which penetrates the wall or is to be made watertight by the wall is in place an approved prior to installation.

1.11 DESIGN AND PERFORMANCE CRITERIA

A. Thermal Expansion and Contraction:
1. Completed metal wall panel and flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.
2. The design temperature differential shall be not less than <insert design temperature differential [200] °F.
3. Interface between panel and clip shall provide for unlimited thermal movement in each direction along the longitudinal direction.

B. Uniform wind load capacity:

1. Installed wall panel system shall withstand negative design wind loading pressures complying with the following criteria. Anchor clips shall be installed exactly as specified in article 3.

C. ASTM E283: Static pressure air infiltration (doors, windows, curtain walls):
   1. Pressure Leakage Rate
      a. 1.57 PSF 0.0033 cfm/sq. ft.
      b. 6.24 PSF 0.0056 cfm/sq. ft.
      c. 12.0 PSF 0.062 cfm/sq. ft.
      d. 15.0 PSF 0.064 cfm/sq. ft
      e. 20.0 PSF 0.074 cfm/sq. ft.

D. ASTM E330: Uniform static load test for structural performance for 1 ½" panel profile: Test results must provide an allowable pressure of no less than:
   1. 42 lbs./ sq. ft. For 3'-0" spans
   2. 52 lbs./ sq. ft. for 1'-0" span

E. ASTM E331: Static pressure water infiltration (doors, windows, curtain walls):
   1. Pressure Result:
      a. 5 Gal./Hr. per S.F. and Static No Leakage
      b. Pressure of 20.0 Psf. For 15 minutes.

1.12 WARRANTIES

A. Manufacturer shall execute a single warranty covering of the following criteria. Multiple-source warranties are not acceptable.
   1. Manufacturer's ten (10) year watertight warranty.
   2. Manufacturer's standard twenty (20) year finish warranty covering checking, crazing, peeling, chalking, fading, or adhesion.
   3. Installer's two (2) year warranty covering wall panel system installation.
   4. Warranties shall commence on date of Substantial Completion.
   5. Provide a single warranty by a single approved manufacturer for roof areas, wall areas, and transitions between the two systems, if applicable.

1.13 MANUFACTURER'S INSPECTIONS

A. When the project is in progress, the wall panel system manufacturer will inspect the work not less than 3 days per week. In addition, the manufacturer will:
   1. Keep the Architect or Owner informed as to the progress and quality of the work as observed.
   2. Provide periodic job site inspections a minimum of three (3) day per week.
   3. Report to the Architect in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
   4. Confirm after completion that manufacturer has observed no applications procedures in conflict with the specifications other than those that may have been previously reported and corrected.

PART 2 – PRODUCTS

2.1 PRODUCTS, GENERAL

A. Refer to Division 01 Section "Common Product Requirements."

B. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified here in shall be regarded as the minimum standard of quality required for work of this Section. Comply with all manufacturer and contractor/fabricator quality and performance criteria specified in Part 1.

2.2 ACCEPTABLE MANUFACTURERS

A. The design is based upon R-MER Wall Pan wall panel systems engineered and manufactured by:
The Garland Company
3800 East 91st Street
Cleveland, Ohio 44105
Steve Lampman
Telephone: (949)-322-1770

B. Site Formed Panels: Bidder will not be allowed to supply panels formed at the job-site on portable roll formers; metal panels must be factory pre-manufactured and engineered for this project.

2.3 METAL WALL PANEL SYSTEM

A. General
1. The products, quality, and performance criteria specified shall be regarded as the minimum standard of quality required for the project.
2. Basis of Design: R-MER Wall Pan System manufactured by The Garland Company, Cleveland, OH.

B. Materials
Panel material:.040" thickness aluminum, 3105-H14 alloy, smooth as per ASTM B209-96.
1. Flashing and flat stock material: Fabricate in profiles indicated on drawings of same material, thickness, and finish as wall panel system, unless indicated otherwise.

C. Finish on surfaces:
1. Exposed surfaces for coated panels:
a. Two coat coil applied, baked-on full-strength (70% resin) fluorocarbon coating system (polyvinylidene fluoride, PVF2), applied by manufacturer's approved applicator.
b. Color shall be Standard Color.
2. Unexposed surfaces for coated panels shall be baked-on polyester coating with .20 - .30 dry film thickness (TDF).
3. Exposed and unexposed surfaces for uncoated panels shall be as shipped from the mill.

D. Characteristics:
1. Fabrication: Panels shall be factory roll-formed from the specified metal. Field rolled panels will not be allowed. 1.
2. Configuration: Interlocking flush/flat seams incorporating concealed anchor clips. Through fastened or exposed fastener systems are not acceptable.
3. Panel seam legs shall be one and one half (1 ½) inch nominal concealed depth behind the panel face. Seam shall allow for expansion and contraction of panels due to thermal changes.
4. Anchor clips: Clips shall be 22 gauge galvalume steel designed to allow thermal movement of the panel in each direction along the longitudinal dimension.
5. Panel Width (Seam Spacing): 12" nominal.
6. Panel lengths: Full length without joints to the extent as is practical.
7. Profile of panel face shall have mesa's every two (2) on center continuous throughout panel which are a minimum of one and one half (1 ½) inches wide. These will absorb thermal stresses, reduce oil canning, and provide aesthetic appeal.

E. Accessories:
   1. Fasteners:
      a. Concealed fasteners: Corrosion resistant steel screws, #10 x 1” long, pancake head, Phillips drive. Use self-drilling, self-tapping for metal substrate or A-point for plywood substrate.
      b. Exposed fasteners: Series 410 stainless steel screws or one eighth (1/8) inch diameter stainless steel waterproof rivets. All exposed fasteners shall be factory painted o match the color of the wall panels.
   2. Provide all miscellaneous accessories for complete installation.

2.4 ACCESSORY PRODUCTS

A. Sealant:
   1. Acceptable product:
      a. Concealed Application: Non-curing butyl sealant or equal.
      b. Exposed Application: Garland SS sealant or equal.
   2. Colors: As selected by architect from sealant manufacturer’s standard selection.

B. Wall Substrate:
   1. Install 15/32” (minimum) thickness exterior grade plywood sheathing along wall area.
   2. Install ¾” high x 24 gauge (minimum) galvanized steel during hat sections to wall structural substrate. Hat sections shall be installed perpendicular to panel seams, and shall be spaced thirty (30) inches on center (maximum) to accommodate the panel fastener spacing given in article 3.2 C.
   3. Install ¾” high x 16 gauge galvanized steel zee furring sections to the wall structural substrate. Zee sections shall be installed perpendicular to panel seams, and shall be spaced thirty (30) inches on center (maximum) to accommodate to the panel anchor clip spacing given in article 3.2 C.

C. Underlayment:
   1. Underlayment shall be one ply of R-Mer Seal self-adhesive Seams shall be lapped in accordance with manufacturer’s recommendations.

1.5 FABRICATION

A. Shop fabricate metal panels and flashing components to the maximum extent possible, forming metal work with clear, sharp, straight, and uniform bends and rises. Hem exposed edges of flashings.

B. Form flashing components from full single width sheet in minimum ten (10’-0”) feet sections. Provide shop fabricated, mitered corners, joined using closed end pop rivets and joint sealant.

C. Fabricate panels and related sheet metal work in accordance with approved shop drawings and applicable standards.

PART 3 – EXECUTION

3.1 EXECUTION, GENERAL

A. Comply with requirements of Division 01 Section “Common Execution Requirements.”

3.2 PREPARATION

A. Inspection: Examine the alignment and placement of the building structure and substrate. Correct any objectionable warp, waves or buckles in the substrate before proceeding with installation of the pre-formed metal panels.

B. Pre-installation conference: Prior to beginning metal wall panel work, convene a pre-installation conference as specified in Part 1 of this Specification.

C. It is understood that the ongoing operations of the Owner area of a critical nature as to leak sensitivity. Do not work on more wall area than can be restored completely watertight in one day.

3.3 INSTALLATION, GENERAL

A. Install wall system when the atmospheric dry bulb temperature is minimum forty (40) degrees Fahrenheit and rising.

B. Install all components of the wall system in exact accordance with the manufacturer's standard published procedures as applicable to these project conditions and substrates.

3.4 WALL PANEL INSTALLATION

A. Comply with all details and install wall panel materials and flashings in accordance with approved Manufacturer's [details<or>shop drawings] and manufacturer's product data within specified erection tolerances.

B. Isolate dissimilar metals and masonry or concrete from metals with bituminous coating. Use gasketed fasteners where required to prevent corrosive action between fastener, substrate, and panels.

C. Limit exposed fasteners to extent indicated on shop drawings.

D. Seal laps and joints in accordance with system manufacturer's product data.

E. Installed system shall be true to line and plane and free of dents, and physical defects. In light gauge panels with wide flat surfaces, some oil canning may be present. Oil canning does not affect the finish or structural integrity of the panel and is therefore not cause for rejection.

F. Form joints in linear sheet metal to allow for one fourth (1/4) inch minimum expansion at twenty (20'-0") feet on center maximum and eight (8'-0") feet from corners.

G. At joints in linear sheet metal items, set sheet metal items in two (2) one fourth (1/4) inch beads of butyl sealant. Extend sealant over all metal surfaces. Mate components for positive seal. Allow no sealant to migrate onto exposed surfaces.

3.5 CLEANING

A. Clean installed work in accordance with the manufacturer's instructions.

B. Replace damaged work than cannot be restored by normal cleaning methods.

3.6 CONSTRUCTION WASTE MANAGEMENT

A. Remove and properly dispose of waste products generated during construction. Comply with requirements of authorities having jurisdiction.

3.7 FINAL INSPECTION

A. At completion of installation and associated work, meet with Contractor, Architect, installer, installer of associated work, Owner, system manufacturer's representative, and other representatives directly concerned with performance of system.

B. Inspect work and flashing of penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.

C. Repair or replace deteriorated or defective work found at time above inspection as required to a produce an installation which is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

D. Notify the Owner upon completion of corrections.

E. Following the final inspection, provide written notice of acceptance of the installation from the system manufacturer.

F. Immediately correct leakage during construction. If the Contractor does not respond within twenty four (24) hours, the Owner will exercise rights to correct the Work under the terms of the Conditions of the Contract.

END OF SECTION 07421

SECTION 07550
HOT ASPHALT MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Hot Applied 3-Ply Asphalt Roofing

1.2 REFERENCES

A. ASTM E 108 - Standard Test Methods for Fire Test of Roof Coverings

B. Factory Mutual Research (FM): Roof Assembly Classifications.

C. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.

D. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.

E. Underwriters Laboratories, Inc. (UL): Fire Hazard Classifications.

F. Warnock Hersey (WH): Fire Hazard Classifications.

G. ASCE 7, Minimum Design Loads for Buildings and Other Structures

H. California Title 24 Energy Efficient Standards.

1.3 DESIGN / PERFORMANCE REQUIREMENTS

A. Perform work in accordance with all federal, state and local codes.

B. Exterior Fire Test Exposure: Roof system shall achieve a UL, FM or WH Class rating for roof slopes indicated on the Drawings as follows:
   1. Factory Mutual Class A Rating.
   2. Underwriters Laboratory Class A Rating.
   3. Warnock Hersey Class A Rating.

C. Energy Star: Roof System shall comply with the initial and aged reflectivity required by the U.S. Federal Government's Energy Star program.

1.4 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation instructions.

B. Shop Drawings: Submit shop drawings including installation details of roofing, flashing, fastening, insulation and vapor barrier, including notation of roof slopes and fastening patterns of insulation and base modified bitumen membrane, prior to job start.

C. Design Pressure Calculations: Submit design pressure calculations for the roof area in accordance with ASCE 7 and local Building Code requirements. Include a roof system attachment analysis report, certifying the system's compliance with applicable wind load requirements before Work begins. Report shall be signed and sealed by a Professional

Engineer registered in the State of the Project who has provided roof system attachment analysis for not less than 5 consecutive years.

D. Verification Samples: For each modified bituminous membrane ply product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

E. Manufacturer's Certificates: Provide to certify products meet or exceed specified requirements.

F. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM D5147. Testing must be performed at 77 deg. F. Tests at 0 deg. F will not be considered.

G. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM D5147.

H. Manufacturer's Fire Compliance Certificate: Certify that the roof system furnished is approved by Factory Mutual (FM), Underwritters Laboratories (UL), Warnock Hersey (WH) or approved third party testing facility in accordance with ASTM E108, Class A for external fire and meets local or nationally recognized building codes.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified with documented ISO 9001 certification and minimum of twelve years of documented experience and must not have been in Chapter 11 bankruptcy during the last five years.

C. Installer Qualifications: Company specializing in performing Work of this section with minimum five years documented experience and a certified Pre-Approved Garland Contractor.

D. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress.

E. Product Certification: Provide manufacturer's certification that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.

F. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.

1.6 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to commencing Work of this section.

B. Review installation procedures and coordination required with related Work.

C. Inspect and make notes of job conditions prior to installation:
   1. Record minutes of the conference and provide copies to all parties present.
   2. Identify all outstanding issues in writing designating the responsible party for follow-up action and the timetable for completion.

3. Installation of roofing system shall not begin until all outstanding issues are resolved to the satisfaction of the Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging with labels intact until ready for installation.

B. Store all roofing materials in a dry place, on pallets or raised platforms, out of direct exposure to the elements until time of application. Store materials at least 4 inches above ground level and covered with "breathable" tarpaulins.

C. Stored in accordance with the instructions of the manufacturer prior to their application or installation. Store roll goods on end on a clean flat surface except store KEE-Stone FB 60 rolls flat on a clean flat surface. No wet or damaged materials will be used in the application.

D. Store at room temperature wherever possible, until immediately prior to installing the roll. During winter, store materials in a heated location with a 50 degree F (10 degree C) minimum temperature, removed only as needed for immediate use. Keep materials away from open flame or welding sparks.

E. Avoid stockpiling of materials on roofs without first obtaining acceptance from the Architect/Engineer.

F. Adhesive storage shall be between the range of above 50 degree F (10 degree C) and below 80 degree F (27 degree C). Area of storage shall be constructed for flammable storage.

1.8 COORDINATION

A. Coordinate Work with installing associated metal flashings as work of this section proceeds.

1.9 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Garland Company or District pre-approved equal. Local contact: Steve Lampman 949-322-1770

B. 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 coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.

d. Will waive all claims for additional cost related to substitution, which consequently become apparent.

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 contractors request for manufacturer substitution.

2.2 HOT APPLIED 3-PLY ASPHALT ROOFING

A. Red Rosin Paper: Loose laid over deck prior to nailed base sheet

B. Nailable Base Sheet: One ply fastened to the deck per wind uplift calculations.
1. HPR Glasbase:

C. Base (Ply) Sheet: Two plies bonded to the prepared substrate with Interply Adhesive:
1. HPR Glasfelt:

D. Modified Cap (Ply) Sheet: One ply bonded to the prepared substrate with interply Adhesive.
1. StressPly Plus FR Mineral:

E. Interply Adhesive: (1, 2 and 3)
1. Generic Type III Asphalt:

F. Flashing Base Ply: One ply bonded to the prepared substrate with Interply Adhesive except for torch applied:
1. StressBase 80:

G. Flashing Cap (Ply) Sheet: One ply bonded to the prepared substrate with Interply Adhesive except for torch applied:
1. StressPly Plus FR Mineral:

H. Flashing Ply Adhesive:
1. Generic Type III Asphalt:

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Inspect and approve the deck condition, slopes and fastener backing if applicable, parapet walls, expansion joints, roof drains, stack vents, vent outlets, nailers and surfaces and elements.

C. Verify that work penetrating the roof deck, or which may otherwise affect the roofing, has been properly completed.

D. If substrate preparation and other conditions are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. General: Clean surfaces thoroughly prior to installation.
   1. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
   2. Fill substrate surface voids that are greater than 1/4 inch wide with an acceptable fill material.
   3. Roof surface to receive roofing system shall be smooth, clean, free from loose gravel, dirt and debris, dry and structurally sound.
   4. Wherever necessary, all surfaces to receive roofing materials shall be power broom and vacuumed to remove debris and loose matter prior to starting work.
   5. Do not apply roofing during inclement weather. Do not apply roofing membrane to damp, frozen, dirty, or dusty surfaces.
   6. Fasteners and plates for fastening components mechanically to the substrate shall provide a minimum pull-out capacity of 300 lbs. (136 k) per fastener. Base or ply sheets attached with cap nails require a minimum pullout capacity of 40 lb. per nail.
   7. Prime decks where required, in accordance with requirements and recommendations of the primer and deck manufacturer.

3.3 INSTALLATION - GENERAL

A. Install modified bitumen membranes and flashings in accordance with manufacturer's instructions and with the recommendations provided by the National Roofing Contractors Association's Roofing & Waterproofing Manual, the Asphalt Roofing Manufacturers Association, and applicable codes.

B. General: Avoid installation of modified bitumen membranes at temperatures lower than 40-45 degrees F. When work at such temperatures unavoidable use the following precautions:
   1. Take extra care during cold weather installation and when ambient temperatures are affected by wind or humidity, to ensure adequate bonding is achieved between the surfaces to be joined. Use extra care at material seam welds and where adhesion of the applied product to the appropriately prepared substrate as the substrate can be affected by such temperature constraints as well.
   2. Unrolling of cold materials, under low ambient conditions must be avoided to prevent the likelihood of unnecessary stress cracking. Rolls must be at least 40 degrees F at the time of application. If the membrane roll becomes stiff or difficult to install, it must be replaced with roll from a heated storage area.

C. Commence installation of the roofing system at the lowest point of the roof (or roof area), working up the slope toward the highest point. Lap sheets shingle fashion so as to constantly shed water

D. All slopes greater than 2:12 require back-nailing to prevent slippage of the ply sheets. Use ring or spiral-shank 1 inch cap nails, or screws and plates at a rate of 1 fastener per ply (including the membrane) at each insulation stop. Place insulation stops at 16 ft o.c. for slopes less than 3:12 and 4 feet o.c. for slopes greater than 3:12. On non-insulated systems, nail each ply directly into the deck at the rate specified above. When slope exceeds 2:12, install all plies parallel to the slope (strapping) to facilitate backnailing. Install 4 additional fasteners at the upper edge of the membrane when strapping the plies.

3.4 INSTALLATION HOT APPLIED ROOF SYSTEM

A. Base/Felt Ply(s): Install base sheet or felt plies in twenty five (25) lbs (11.3kg) per square of bitumen shingled uniformly to achieve one or more plies over the entire prepared substrate. Shingle in direction of slope of roof to shed water on each area of roof. Do not step on base rolls until asphalt has cooled, fish mouths should be cut and patched.
   1. Lap ply sheet ends 8 inches (203 mm). Stagger end laps 2 inches (304mm) minimum.

2. Install base flashing ply to all perimeter and projection details after membrane application.
3. Extend plies 2 inches beyond top edges of cants at wall and projection bases.
4. Install base flashing ply to all perimeter and projection details.
5. Allow the one ply of base sheet to cure at least 30 minutes before installing the modified membrane. However, the modified membrane must be installed the same day as the base plies.

B. Modified Cap Ply(s): Solidly bond the modified membrane to the base layers with specified material at the rate of 25 to thirty 30 lbs. (11-13kg) per 100 square feet.
1. Roll must push a puddle of hot material in front of it with material slightly visible at all side laps. Use care to eliminate air entrapment under the membrane. Exercise care during application to eliminate air entrapment under the membrane.
2. Apply pressure to all seams to ensure that the laps are solidly bonded to substrate.
3. Install subsequent rolls of modified membrane as above with a minimum of 4 inch (101 mm) side laps and 8 inch (203 mm) end laps. Stagger end laps. Apply 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. Apply hot material no more than 5 feet (1.5 m) ahead of each roll being embedded.
5. Extend membrane 2 inches (50 mm) beyond top edge of all cants in full moppings of the specified hot material.

C. Fibrous Cant Strips: Provide non-combustible perlite or glass fiber cant strips at all wall/curb detail treatments where angle changes are greater than 45 degrees. Cant may be set in approved cold adhesives, hot asphalt or mechanically attached with approved plates and fasteners.

D. Wood Blocking, Nailers and Cant Strips: Provide wood blocking, nailers and cant strips as specified in Section 06114.
1. Provide nailers at all roof perimeters and penetrations for fastening membrane flashings and sheet metal components.
2. Wood nailers should match the height of any insulation, providing a smooth and even transition between flashing and insulation areas.
3. Nailer lengths should be spaced with a minimum 1/8 inch gap for expansion and contraction between each length or change of direction.
4. Nailers and flashings should be fastened in accordance with Factory Mutual "Loss Prevention Data Sheet 1- 49, Perimeter Flashing" and be designed to be capable of resisting a minimum force of 200 lbs/lineal foot in any direction.

E. Metal Work: Provide metal flashings, counter flashings, parapet coping caps and thru-wall flashings in accordance with the SMACNA "Architectural Sheet Metal Manual" or the NRCA Roofing Waterproofing manual.

F. Termination Bar: Provide a metal termination bar or approved top edge securement at the terminus of all flashing sheets at walls and curbs. Fasten the bar a minimum of 8 inches (203 mm) o/c to achieve constant compression. Provide suitable, sealant at the top edge if required.

G. Flashing Base Ply: Install flashing sheets by the same application method used for the base ply.
1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
2. Prepare all walls, penetrations, expansion joints and surfaces to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
3. Adhere to the underlying base flashing ply with specified hot material unless otherwise noted in these specifications. Nail off at a minimum of 8 inches (203 mm) o.c. from the

finished roof at all vertical surfaces.

4. Solidly adhere the entire sheet of flashing membrane to the substrate.
5. Seal all vertical laps of flashing membrane with a three-course application of trowel-grade mastic and mesh.
6. Coordinate counter flashing, cap flashings, expansion joints, and similar work with modified bitumen roofing work as specified.
7. Coordinate roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices with the roofing system work.

H. Flashing Cap Ply: Install flashing cap sheets by the same application method used for the cap ply.

1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
3. Adhere to the underlying base flashing ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
4. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.
5. Coordinate roof accessories, miscellaneous sheet metal accessory items with the roofing system work.
6. All stripping shall be installed prior to flashing cap sheet installation.
7. Heat and scrape granules when welding or adhering at cut areas and seams to granular surfaces at all flashings.
8. Secure the top edge of the flashing sheet using a termination bar only when the wall surface above is waterproofed, or nailed 4 inches on center and covered with an acceptable counter flashing.

I. Roof Walkways: Provide walkways in areas indicated on the Drawings.

3.5 CLEANING

A. Clean-up and remove daily from the site all wrappings, empty containers, paper, loose particles and other debris resulting from these operations.

B. Remove asphalt markings from finished surfaces.

C. Repair or replace defaced or disfigured finishes caused by Work of this section.

3.6 PROTECTION

A. Provide traffic ways, erect barriers, fences, guards, rails, enclosures, chutes and the like to protect personnel, roofs and structures, vehicles and utilities.

B. Protect exposed surfaces of finished walls with tarps to prevent damage.

C. Plywood for traffic ways required for material movement over existing roofs shall be not less than 5/8 inch (16 mm) thick.

D. In addition to the plywood listed above, an underlayment of minimum 1/2 inch (13 mm) recover board is required on new roofing.

E. Special permission shall be obtained from the Manufacturer before any traffic shall be permitted over new roofing.

3.7 FIELD QUALITY CONTROL

A. Inspection: Provide manufacturer's field observations 3 days per week. Provide a final inspection upon completion of the Work.
   1. Warranty shall be issued upon manufacturer's acceptance of the installation.
   2. Field observations shall be performed by a Sales Representative employed full-time by the manufacturer and whose primary job description is to assist, inspect and approve membrane installations for the manufacturer.
   3. Provide observation reports from the Sales Representative indicating procedures followed, weather conditions and any discrepancies found during inspection.
   4. Provide a final report from the Sales Representative, certifying that the roofing system has been satisfactorily installed according to the project specifications, approved details and good general roofing practice.

3.8 SCHEDULES

A. Base (Ply) Sheet:
   1. HPR Glasfelt: ASTM D 2178 Type IV, Asphalt saturated fiberglass felt.
      a. Meets or Exceeds ASTM D 2178 Type IV Performance Criteria.

B. Modified Cap (Ply) Sheet:
   1. StressPly Plus FR Mineral: 155 mil SBS (Styrene-Butadiene-Styrene) mineral surfaced, rubber modified roofing membrane reinforced with a fiberglass and polyester composite scrim. ASTM D 6162, Type III Grade G
      a. Tensile Strength, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 310 lbf/in XD 310 lbf/in
         2) 50 mm/min. @ 23 +/- 2 deg. C MD 54.25 kN/m XD 54.25 kN/m
      b. Tear Strength, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 500 lbf XD 500 lbf
         2) 50 mm/min. @ 23 +/- 2 deg. C MD 2224 N XD 2224 N
      c. Elongation at Maximum Tensile, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 8% XD 8%
         2) 50 mm/min. @ 23 +/- 2 deg. C MD 8% XD 8%
      d. Low Temperature Flexibility, ASTM D 5147, Passes -30 deg. F (-34 deg. C)

C. Interply Adhesive:
   1. Generic Type III Asphalt: Hot Bitumen, ASTM D 312, Type III steep asphalt having the following characteristics:
      a. Softening Point 185 deg. F - 205 deg. F
      b. Flash Point 500 deg. F
      c. Penetration @ 77 deg. F 15-35 units
      d. Ductility @ 77 deg. F 2.5 cm

D. Flashing Base Ply:
   1. StressBase 80: 80 mil SBS (Styrene-Butadiene-Styrene) rubber modified roofing base sheet reinforced with a fiberglass scrim, performance requirements according to ASTM D 5147.
      a. Tensile Strength, ASTM D 5147
         1) 2 in/min. @ 0 +/- 3.6 deg. F MD 100 lbf/in XD 100 lbf/in
         2) 50 mm/min. @ -17.78 +/- 2 deg. C MD 17.5 kN/m XD 17.5 kN/m
      b. Tear Strength, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 110 lbf XD 100 lbf
         2) 50 mm/min. @ 23 +/- 2 deg. C MD 489 N XD 444 N
      c. Elongation at Maximum Tensile, ASTM D 5147
         1) 2 in/min. @ 0 +/- 3.6 deg. F MD 4 % XD 4 %
         2) 50 mm/min. @ -17.78 +/- 2 deg. C MD 4 % XD 4 %
      d. Low Temperature Flexibility, ASTM D 5147

1) Passes -40 deg. F (-40 deg. C)

E. Flashing Ply Adhesive:
1. Generic Type III Asphalt: Hot Bitumen, ASTM D 312, Type III steep asphalt having the following characteristics:
a. Softening Point 185 deg. F - 205 deg. F
b. Flash Point 500 deg. F
c. Penetration @ 77 deg. F 15-35 units
d. Ductility @ 77 deg. F 2.5 cm

F. Surfacing:
1. Flashing Cap (Ply) Sheet:
a. StressPly Plus FR Mineral: 155 mil SBS (Styrene-Butadiene-Styrene) mineral surfaced, rubber modified roofing membrane reinforced with a fiberglass and polyester composite scrim. ASTM D 6162, Type III Grade G
1) Tensile Strength, ASTM D 5147
a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 310 lbf/in XD 310 lbf/in
b) 50 mm/min. @ 23 +/- 2 deg. C MD 54.25 kN/m XD 54.25 kN/m
2) Tear Strength, ASTM D 5147
a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 500 lbf XD 500 lbf
b) 50 mm/min. @ 23 +/- 2 deg. C MD 2224 N XD 2224 N
3) Elongation at Maximum Tensile, ASTM D 5147
a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 8% XD 8%
b) 50 mm/min. @ 23 +/- 2 deg. C MD 8% XD 8%
4) Low Temperature Flexibility, ASTM D 5147, Passes -30 deg. F (-34 deg. C)

END OF SECTION

SECTION 07551
TORCH MODIFIED MEMBRANE ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Torch Applied 2-Ply Asphalt Roofing

1.2 REFERENCES

A. ASTM D 1863 Standard Specification for Mineral Aggregate Used as a Protective Coating for Roofing.

B. ASTM D 6162 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.

C. ASTM D 6163 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.

D. ASTM D 6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

E. ASTM E 108 - Standard Test Methods for Fire Test of Roof Coverings

F. Factory Mutual Research (FM): Roof Assembly Classifications.

G. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.

H. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.

I. Underwriters Laboratories, Inc. (UL): Fire Hazard Classifications.

J. Warnock Hersey (WH): Fire Hazard Classifications.

K. ANSI-SPRI ES-1 Wind Design Standard for Edge Systems used with Low Slope Roofing Systems.

L. ASCE 7, Minimum Design Loads for Buildings and Other Structures

M. UL - Fire Resistance Directory.

N. FM Approvals - Roof Coverings and/or RoofNav assembly database.

O. California Title 24 Energy Efficient Standards.

1.3 DESIGN / PERFORMANCE REQUIREMENTS

A. Perform work in accordance with all federal, state and local codes.

B. Exterior Fire Test Exposure: Roof system shall achieve a UL, FM or WH Class A rating

1.4 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.
3. Installation instructions.

B. Shop Drawings: Submit shop drawings including installation details of roofing, flashing, fastening, insulation and vapor barrier, including notation of roof slopes and fastening patterns of insulation and base modified bitumen membrane, prior to job start.

C. LEED Submittals: Provide documentation of how the requirements of Credit will be met:
1. List of proposed materials with recycled content. Indicate post-consumer recycled content and pre-consumer recycled content for each product having recycled content.
2. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.
3. Product reflectivity and emissivity criteria to qualify for one point under the LEED credit category, Credit 7.2, Landscape & Exterior Design to Reduce Heat Island - Roof.

D. Recycled or Bio-Based Materials: Provide third party certification through UL Environment of roof System membranes containing recycled or bio based materials.

E. Design Pressure Calculations: Submit design pressure calculations for the roof area in accordance with ASCE 7 and local Building Code requirements. Include a roof system attachment analysis report, certifying the system's compliance with applicable wind load requirements before Work begins. Report shall be signed and sealed by a Professional Engineer registered in the State of the Project who has provided roof system attachment analysis for not less than 5 consecutive years.

F. Verification Samples: For each modified bituminous membrane ply product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

G. Manufacturer's Certificates: Provide to certify products meet or exceed specified requirements.

H. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM D5147. Testing must be performed at 77 deg. F. Tests at 0 deg. F will not be considered.

I. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic inspection and maintenance of all completed roofing work. Provide product warranty executed by the manufacturer. Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified with documented ISO 9001 certification and minimum of twelve years of documented experience and must not have been in Chapter 11 bankruptcy during the last five years.

C. Installer Qualifications: Company specializing in performing Work of this section with minimum five years documented experience and a certified Pre-Approved Garland Contractor.

D. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress.

E. Product Certification: Provide manufacturer's certification that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.

F. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.

1.6 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to commencing Work of this section.

B. Review installation procedures and coordination required with related Work.

C. Inspect and make notes of job conditions prior to installation:
   1. Record minutes of the conference and provide copies to all parties present.
   2. Identify all outstanding issues in writing designating the responsible party for follow-up action and the timetable for completion.
   3. Installation of roofing system shall not begin until all outstanding issues are resolved to the satisfaction of the Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging with labels intact until ready for installation.

B. Store all roofing materials in a dry place, on pallets or raised platforms, out of direct exposure to the elements until time of application. Store materials at least 4 inches above ground level and covered with "breathable" tarpaulins.

C. Stored in accordance with the instructions of the manufacturer prior to their application or installation. Store roll goods on end on a clean flat surface except store KEE-Stone FB 60 rolls flat on a clean flat surface. No wet or damaged materials will be used in the application.

D. Store at room temperature wherever possible, until immediately prior to installing the roll. During winter, store materials in a heated location with a 50 degree F (10 degree C) minimum temperature, removed only as needed for immediate use. Keep materials away from open flame or welding sparks.

E. Avoid stockpiling of materials on roofs without first obtaining acceptance from the Architect/Engineer.

F. Adhesive storage shall be between the range of above 50 degree F (10 degree C) and below 80 degree F (27 degree C). Area of storage shall be constructed for flammable storage.

1.8 COORDINATION

A. Coordinate Work with installing associated metal flashings as work of this section proceeds.

1.9 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Garland Company or District pre-approved equal. Local contact: Steve Lampman 949-322-1770

B. 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 coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.
      d. Will waive all claims for additional cost related to substitution, which consequently become apparent.
      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 contractors request for manufacturer substitution.

2.2 TORCH APPLIED 2-PLY ASPHALT ROOFING

A. Base (Ply) Sheet:
   1. HPR Torch Base:

B. Modified Cap (Ply) Sheet: One ply bonded to the prepared substrate.
   1. StressPly IV Plus Mineral:
   2. HPR Torch Base:

C. Flashing Cap (Ply) Sheet
   1. StressPly IV Plus Mineral:

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Inspect and approve the deck condition, slopes and fastener backing if applicable, parapet walls, expansion joints, roof drains, stack vents, vent outlets, nailers and surfaces and elements.

C. Verify that work penetrating the roof deck, or which may otherwise affect the roofing, has been properly completed.

D. If substrate preparation and other conditions are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. General: Clean surfaces thoroughly prior to installation.
   1. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
   2. Fill substrate surface voids that are greater than 1/4 inch wide with an acceptable fill material.
   3. Roof surface to receive roofing system shall be smooth, clean, free from loose gravel, dirt and debris, dry and structurally sound.
   4. Wherever necessary, all surfaces to receive roofing materials shall be power broom and vacuumed to remove debris and loose matter prior to starting work.
   5. Do not apply roofing during inclement weather. Do not apply roofing membrane to damp, frozen, dirty, or dusty surfaces.
   6. Fasteners and plates for fastening components mechanically to the substrate shall provide a minimum pull-out capacity of 300 lbs. (136 k) per fastener. Base or ply sheets attached with cap nails require a minimum pullout capacity of 40 lb. per nail.
   7. Prime decks where required, in accordance with requirements and recommendations of the primer and deck manufacturer.

3.3 INSTALLATION - GENERAL

A. Install modified bitumen membranes and flashings in accordance with manufacturer's instructions and with the recommendations provided by the National Roofing Contractors Association's Roofing & Waterproofing Manual, the Asphalt Roofing Manufacturers Association, and applicable codes.

B. General: Avoid installation of modified bitumen membranes at temperatures lower than 40-45 degrees F. When work at such temperatures unavoidable use the following precautions:
   1. Take extra care during cold weather installation and when ambient temperatures are affected by wind or humidity, to ensure adequate bonding is achieved between the surfaces to be joined. Use extra care at material seam welds and where adhesion of the applied product to the appropriately prepared substrate as the substrate can be affected by such temperature constraints as well.
   2. Unrolling of cold materials, under low ambient conditions must be avoided to prevent the likelihood of unnecessary stress cracking. Rolls must be at least 40 degrees F at the time of application. If the membrane roll becomes stiff or difficult to install, it must be replaced with roll from a heated storage area.

C. Commence installation of the roofing system at the lowest point of the roof (or roof area), working up the slope toward the highest point. Lap sheets shingle fashion so as to constantly shed water

D. All slopes greater than 2:12 require back-nailing to prevent slippage of the ply sheets. Use ring or spiral-shank 1 inch cap nails, or screws and plates at a rate of 1 fastener per ply (including the membrane) at each insulation stop. Place insulation stops at 16 ft o.c. for slopes less than 3:12 and 4 feet o.c. for slopes greater than 3:12. On non-insulated systems, nail each ply directly into the deck at the rate specified above. When slope exceeds 2:12, install all plies parallel to the slope (strapping) to facilitate backnailing. Install 4 additional fasteners at the upper edge of the membrane when strapping the plies.

3.4 INSTALLATION TORCH APPLIED 2-PLY ASPHALT ROOFING

A. Base Ply: Install torch base sheet to a properly prepared substrate. Shingle in proper direction to shed water on each area of roofing.
   1. Lay out the roll in the course to be followed and unroll 6 feet (1.8 m).
   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 6 feet (1.8 m) and bond it in a similar fashion.
   4. Repeat this operation with subsequent rolls with side laps of 4 inches (101 mm) and end laps of 8 inches (203 mm).
   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 2 inches (50 mm) beyond top edges of cants at wall and projection bases.
   7. Install base flashing ply to all perimeter and projections details.

B. Modified Cap (Ply) Sheet: Over torch base sheet underlayment, lay out the roll in the course to be followed and unroll 6 feet (1.8 m). Stagger seams over the torch base sheet seams.
   1. 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.
   2. After the major portion of the roll is bonded, re-roll the first 6 feet (1.8 m) and bond it in a similar fashion.
   3. Repeat this operation with subsequent rolls with side laps of 4 inches (101 mm) and end laps of 8 inches (203 mm).
   4. 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.

C. Fibrous Cant Strips: Provide non-combustible perlite or glass fiber cant strips at all wall/curb detail treatments where angle changes are greater than 45 degrees. Cant may be set in approved cold adhesives, hot asphalt or mechanically attached with approved plates and fasteners.

D. Wood Blocking, Nailers and Cant Strips: Provide wood blocking, nailers and cant strips as specified in Section 06114.
   1. Provide nailers at all roof perimeters and penetrations for fastening membrane flashings and sheet metal components.
   2. Wood nailers should match the height of any insulation, providing a smooth and even transition between flashing and insulation areas.
   3. Nailer lengths should be spaced with a minimum 1/8 inch gap for expansion and contraction between each length or change of direction.
   4. Nailers and flashings should be fastened in accordance with Factory Mutual "Loss Prevention Data Sheet 1- 49, Perimeter Flashing" and be designed to be capable of resisting a minimum force of 200 lbs/lineal foot in any direction.

E. Metal Work: Provide metal flashings, counter flashings, parapet coping caps and thru-wall flashings in accordance with the SMACNA "Architectural Sheet Metal Manual" or the NRCA Roofing Waterproofing manual.

F. Termination Bar: Provide a metal termination bar or approved top edge securement at the terminus of all flashing sheets at walls and curbs. Fasten the bar a minimum of 8 inches (203 mm) o/c to achieve constant compression. Provide suitable, sealant at the top edge if required.

G. Flashing Base Ply: Seal all curb, wall and parapet flashings with an application of mastic and

mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.

1. Prepare all walls, penetrations, expansion joints, and other surfaces to be flashed with asphalt primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
2. Adhere modified flashing base to the underlying base flashing ply with specified flashing ply adhesive. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
3. Solidly adhere the entire sheet of flashing membrane to the substrate. Tops of all flashings that are not run up and over curb shall be secured through termination bar 6 inches (152 mm) and sealed at top
4. Seal all vertical laps of flashing membrane with a three-course application of trowel-grade mastic and fiberglass mesh.
5. Coordinate counter flashing, cap flashings, expansion joints, and similar work with modified bitumen roofing work.
6. Coordinate roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices with the roofing system work. When using mineralized cap sheet all stripping plies type IV felt / Versiply 40 shall be installed prior to cap sheet installation.

H. Flashing Cap Ply: Install flashing cap sheets by the same application method used for the base ply.

1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
3. Adhere to the underlying base flashing ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
4. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.
5. Coordinate roof accessories, miscellaneous sheet metal accessory items with the roofing system work.
6. All stripping shall be installed prior to flashing cap sheet installation.
7. Heat and scrape granules when welding or adhering at cut areas and seams to granular surfaces at all flashings.
8. Secure the top edge of the flashing sheet using a termination bar only when the wall surface above is waterproofed, or nailed 4 inches on center and covered with an acceptable counter flashing.

I. Roof Walkways: Provide walkways in areas indicated on the Drawings.

3.5 CLEANING

A. Clean-up and remove daily from the site all wrappings, empty containers, paper, loose particles and other debris resulting from these operations.

B. Remove asphalt markings from finished surfaces.

C. Repair or replace defaced or disfigured finishes caused by Work of this section.

3.6 PROTECTION

A. Provide traffic ways, erect barriers, fences, guards, rails, enclosures, chutes and the like to protect personnel, roofs and structures, vehicles and utilities.

B. Protect exposed surfaces of finished walls with tarps to prevent damage.

C. Plywood for traffic ways required for material movement over existing roofs shall be not less than 5/8 inch (16 mm) thick.

D. In addition to the plywood listed above, an underlayment of minimum 1/2 inch (13 mm) recover board is required on new roofing.

E. Special permission shall be obtained from the Manufacturer before any traffic shall be permitted over new roofing.

3.7 FIELD QUALITY CONTROL

A. Inspection: Provide manufacturer's field observations 3 days per week. Provide a final inspection upon completion of the Work.
   1. Warranty shall be issued upon manufacturer's acceptance of the installation.
   2. Field observations shall be performed by a Sales Representative employed full-time by the manufacturer and whose primary job description is to assist, inspect and approve membrane installations for the manufacturer.
   3. Provide observation reports from the Sales Representative indicating procedures followed, weather conditions and any discrepancies found during inspection.
   4. Provide a final report from the Sales Representative, certifying that the roofing system has been satisfactorily installed according to the project specifications, approved details and good general roofing practice.

3.8 SCHEDULES

A. Base (Ply) Sheet:
   1. HPR Torch Base: 110 mil SBS (Styrene-Butadiene-Styrene) rubber modified roofing base sheet reinforced with a fiberglass scrim. Designed for torch applications with a burn-off backer that indicates when the material is hot enough to be installed.
      a. Tensile Strength, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 210 lbf/in XD 210 lbf/in
         2) 50 mm/min. @ 23 +/- 2 deg. C MD 36.75 kN/m XD 36.75 kN/m
      b. Tear Strength, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 300 lbf XD 300 lbf
         2) 50 mm/min. @ 23 +/- 2 deg. C MD 1,334 N XD 1,334 N
      c. Elongation at Maximum Tensile, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 6% XD 6%
         2) 50 mm/min. @ 23 +/- 2 deg. C MD 6% XD 6%
      d. Low Temperature Flexibility, ASTM D5147, Passes -30 deg. F (-34.4 deg. C)

B. Modified Cap (Ply) Sheet:
   1. StressPly IV Plus Mineral: 195 mil SBS (Styrene-Butadiene-Styrene) mineral surfaced rubber modified roofing membrane with a fiberglass and polyester composite scrim. Designed for torch applications with a burn-off backer that indicates when the material is hot enough to be installed.
      a. Tensile Strength, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 310 lbf/in XD 310 lbf/in
         2) 50 mm/min. @ 23 +/- 2 deg. C MD 54.25 kN/m XD 54.25 kN/m
      b. Tear Strength, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 510 lbf XD 510 lbf
         2) 50 mm/min. @ 23 +/- 2 deg. C MD 2269 N XD 2269 N
      c. Elongation at Maximum Tensile, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 9% XD 8%
         2) 50 mm/min. @ 23 +/- 2 deg. C MD 9% XD 8%
      d. Low Temperature Flexibility, ASTM D 5147, Passes -40 deg. F (-40 deg. C)

C. Flashing Base Ply:
   1. HPR Torchbase: SBS modified, torch applied sheet material. ASTM D 6163, Type II.
      a. Tensile Strength, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 210 lbf/in XD 210 lbf/in
         2) 50 mm/min. @ 23 +/- 2 deg. C MD 210 lbf/in XD 210 lbf/in
      b. Tear Strength, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 300 lbf XD 300 lbf
         2) 50 mm/min. @ 23 +/- 2 deg. C MD 1334 N XD 1334 N
      c. Elongation at Maximum Tensile, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 6 % XD 6 %
         2) 50 mm/min@ 23 +/- 2 deg. C MD 6 % XD 6 %
      d. Low Temperature Flexibility, ASTM D 5147:
         1) Passes -30 deg. F (-34 deg. C). Meets or Exceeds ASTM D 4601 Type II Performance Criteria.

D. Surfacing:
   1. Flashing Cap (Ply) Sheet:
      a. StressPly IV Plus Mineral: 195 mil SBS (Styrene-Butadiene- Styrene) mineral surfaced rubber modified roofing membrane with a dual fiberglass scrim. This membrane is designed for torch applications and has a burn-off backer that indicates when the material is hot enough to be installed. Surfaced with a highly reflective Sunburst mineral.
         1) Tensile Strength, ASTM D 5147
            a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 225 lbf/in CMD 225 lbf/in
            b) 50 mm/min. @ 23 +/- 3 deg. C MD 39.0 kN/m CMD 39.0 kN/m
         2) Tear Strength, ASTM D 5147
            a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 300 lbf CMD 300 lbf
            b) 50 mm/min. @ 23 +/- 3 deg. C MD 1335 N CMD 1335 N
         3) Elongation at Maximum Tensile, ASTM D 5147
            a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 9% CMD 8%
            b) 50 mm/min. @ 23 +/- 3 deg. C MD 9% CMD 8%
         4) Low Temperature Flexibility, ASTM D 5147: Passes -20 deg. F (-29 deg. C)
         5) Reflectivity (DNS Method) 73%

END OF SECTION

SECTION 07552
SELF ADHERING MODIFIED MEMBRANE ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Self-Adhered 2 Ply Roofing

1.2 REFERENCES

A. ASTM E 108 - Standard Test Methods for Fire Test of Roof Coverings

B. Factory Mutual Research (FM): Roof Assembly Classifications.

C. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.

D. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.

E. Underwriters Laboratories, Inc. (UL): Fire Hazard Classifications.

F. Warnock Hersey (WH): Fire Hazard Classifications.

G. ANSI-SPRI ES-1 Wind Design Standard for Edge Systems used with Low Slope Roofing Systems.

H. ASCE 7, Minimum Design Loads for Buildings and Other Structures

I. UL - Fire Resistance Directory.

1.3 DESIGN / PERFORMANCE REQUIREMENTS

A. Perform work in accordance with all federal, state and local codes.

B. Exterior Fire Test Exposure: Roof system shall achieve a UL, FM or WH Class rating for roof slopes indicated on the Drawings as follows:
   1. Factory Mutual Class A Rating.
   2. Underwriters Laboratory Class A Rating.
   3. Warnock Hersey Class A Rating.

C. Energy Star: Roof System shall comply with the initial and aged reflectivity required by the U.S. Federal Government's Energy Star program.

1.4 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation instructions.

B. Shop Drawings: Submit shop drawings including installation details of roofing, flashing, fastening, insulation and vapor barrier, including notation of roof slopes and fastening patterns of insulation and base modified bitumen membrane, prior to job start.

C. Design Pressure Calculations: Submit design pressure calculations for the roof area in accordance with ASCE 7 and local Building Code requirements. Include a roof system attachment analysis report, certifying the system's compliance with applicable wind load

requirements before Work begins. Report shall be signed and sealed by a Professional Engineer registered in the State of the Project who has provided roof system attachment analysis for not less than 5 consecutive years.

D. Verification Samples: For each modified bituminous membrane ply product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

E. Manufacturer's Certificates: Provide to certify products meet or exceed specified requirements.

F. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM D5147. Testing must be performed at 77 deg. F. Tests at 0 deg. F will not be considered.

G. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic inspection and maintenance of all completed roofing work. Provide product warranty executed by the manufacturer. Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified with documented ISO 9001 certification and minimum of twelve years of documented experience and must not have been in Chapter 11 bankruptcy during the last five years.

C. Installer Qualifications: Company specializing in performing Work of this section with minimum five years documented experience and a certified Pre-Approved Garland Contractor.

D. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress.

E. Product Certification: Provide manufacturer's certification that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.

F. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.

1.6 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to commencing Work of this section.

B. Review installation procedures and coordination required with related Work.

C. Inspect and make notes of job conditions prior to installation:
   1. Record minutes of the conference and provide copies to all parties present.
   2. Identify all outstanding issues in writing designating the responsible party for follow-up action and the timetable for completion.
   3. Installation of roofing system shall not begin until all outstanding issues are resolved

to the satisfaction of the Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging with labels intact until ready for installation.

B. Store all roofing materials in a dry place, on pallets or raised platforms, out of direct exposure to the elements until time of application. Store materials at least 4 inches above ground level and covered with "breathable" tarpaulins.

C. Stored in accordance with the instructions of the manufacturer prior to their application or installation. Store roll goods on end on a clean flat surface except store KEE-Stone FB 60 rolls flat on a clean flat surface. No wet or damaged materials will be used in the application.

D. Store at room temperature wherever possible, until immediately prior to installing the roll. During winter, store materials in a heated location with a 50 degree F (10 degree C) minimum temperature, removed only as needed for immediate use. Keep materials away from open flame or welding sparks.

E. Avoid stockpiling of materials on roofs without first obtaining acceptance from the Architect/Engineer.

F. Adhesive storage shall be between the range of above 50 degree F (10 degree C) and below 80 degree F (27 degree C). Area of storage shall be constructed for flammable storage.

1.8 COORDINATION

A. Coordinate Work with installing associated metal flashings as work of this section proceeds.

1.9 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Garland Company or District pre-approved equal. Local contact: Steve Lampman 949-322-1770

B. 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 coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.
d. Will waive all claims for additional cost related to substitution, which consequently become apparent.
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 contractors request for manufacturer substitution.

2.2 SELF ADHERED ROOF SYSTEM

A. Nailable Base Sheet: One ply fastened to the deck per wind uplift calculations.
1. HPR SA FR Base Sheet:

B. Base (Ply) Sheet: One ply bonded to the prepared substrate with self-adhesive.
1. HPR SA FR Base Sheet:

C. Modified Cap (Ply) Sheet: One ply bonded to the prepared substrate with self-adhesive.
1. StressPly SA FR Mineral:

D. Interply Adhesive: Use over approved cover boards or wood decks for base sheet only
1. SA Primer:

E. Flashing Base Ply: One ply bonded to the prepared substrate.
1. HPR SA FR Base Sheet:

F. Flashing Cap (Ply) Sheet: One ply bonded to the prepared substrate.
1. StressPly SA FR Mineral:

G. Flashing Ply Adhesive:
1. SA Primer: Over approved cover boards only.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Inspect and approve the deck condition, slopes and fastener backing if applicable, parapet walls, expansion joints, roof drains, stack vents, vent outlets, nailers and surfaces and elements.

C. Verify that work penetrating the roof deck, or which may otherwise affect the roofing, has been properly completed.

D. If substrate preparation and other conditions are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. General: Clean surfaces thoroughly prior to installation.
1. Prepare surfaces using the methods recommended by the manufacturer for achieving

the best result for the substrate under the project conditions.

2. Fill substrate surface voids that are greater than 1/4 inch wide with an acceptable fill material.
3. Roof surface to receive roofing system shall be smooth, clean, free from loose gravel, dirt and debris, dry and structurally sound.
4. Wherever necessary, all surfaces to receive roofing materials shall be power broom and vacuumed to remove debris and loose matter prior to starting work.
5. Do not apply roofing during inclement weather. Do not apply roofing membrane to damp, frozen, dirty, or dusty surfaces.
6. Fasteners and plates for fastening components mechanically to the substrate shall provide a minimum pull-out capacity of 300 lbs. (136 k) per fastener. Base or ply sheets attached with cap nails require a minimum pullout capacity of 40 lb. per nail.
7. Prime decks where required, in accordance with requirements and recommendations of the primer and deck manufacturer.

B. Deck Preparation for Self-Adhered Roof System: Insulation shall be installed per manufacturer requirements. Sweep or blow away any dust, dirt or sand particles that could interfere with adhesion to approved substrate Georgia Pacific (GP) DensDeck Prime, DensDeck DuraGuard, or USG Securrock and prime with self-adhering primer at the specified coverage rate.

3.3 INSTALLATION - GENERAL

A. Install modified bitumen membranes and flashings in accordance with manufacturer's instructions and with the recommendations provided by the National Roofing Contractors Association's Roofing & Waterproofing Manual, the Asphalt Roofing Manufacturers Association, and applicable codes.

B. General: Avoid installation of modified bitumen membranes at temperatures lower than 40-45 degrees F. When work at such temperatures unavoidable use the following precautions:

1. Take extra care during cold weather installation and when ambient temperatures are affected by wind or humidity, to ensure adequate bonding is achieved between the surfaces to be joined. Use extra care at material seam welds and where adhesion of the applied product to the appropriately prepared substrate as the substrate can be affected by such temperature constraints as well.
2. Unrolling of cold materials, under low ambient conditions must be avoided to prevent the likelihood of unnecessary stress cracking. Rolls must be at least 40 degrees F at the time of application. If the membrane roll becomes stiff or difficult to install, it must be replaced with roll from a heated storage area.

C. Commence installation of the roofing system at the lowest point of the roof (or roof area), working up the slope toward the highest point. Lap sheets shingle fashion so as to constantly shed water

D. All slopes greater than 2:12 require back-nailing to prevent slippage of the ply sheets. Use ring or spiral-shank 1 inch cap nails, or screws and plates at a rate of 1 fastener per ply (including the membrane) at each insulation stop. Place insulation stops at 16 ft o.c. for slopes less than 3:12 and 4 feet o.c. for slopes greater than 3:12. On non-insulated systems, nail each ply directly into the deck at the rate specified above. When slope exceeds 2:12, install all plies parallel to the slope (strapping) to facilitate backnailing. Install 4 additional fasteners at the upper edge of the membrane when strapping the plies.

3.4 INSTALLATION SELF ADHERED ROOF SYSTEM

A. Optional Nailable Base Sheet: Install base sheet nailed to the substrate with the appropriate fastener and fastening pattern determined from your wind uplift calculation.

B. Base Ply: Prior to installation sweep or blow away any dust, dirt or sand particles, on the surface that could interfere with adhesion.

1. Prime the roof cover board at the recommended coverage rate with SA Primer at a rate of 0.50 gal per 100 sq.ft. Allow the primer to dry before installing the base sheet but it should be tacky for the base sheet application.
2. Start HPR SA FR Base Sheet application at the low point of the roof with appropriate roll width to offset side laps 18 inches (457 mm) from side laps of base sheet. Install flush to roof edge if over base sheet, otherwise turn the HPR SA FR Base Sheet over the fascia minimum 2 inches (50 mm) and nail 9 inches (230 mm) o.c. At perimeter flashing extend the HPR SA FR Base Sheet up a minimum of 8 inches (203 mm). Design so that side laps are against the flow of water.
3. Fold membrane back halfway lengthwise to remove the split release film. Press membrane securely into place, and repeat with the opposite half of the membrane. Use a heavy, weighted roller over entire surface of the HPR SA FR Base Sheet membrane to secure membrane. Work outwards to eliminate voids. When working with full rolls on large roofs, leave the membrane in position and remove the split release film from underneath the membrane.
4. Overlap side laps of subsequent HPR SA FR Base Sheet membrane lengths 4 inches (100 mm) and end laps 8 inches (203 mm). Offset (stagger) end laps minimum 3 feet (0.9 m). Cut end laps at opposing diagonal corners at a 45 degree angle approximatly 3 inches (76 mm) from the corners to minimize "T"- seams. Apply a bead or small trowel dab (quarter size) of Flashing Bond or Garla-Flex at the edge of the angled cut to avoid a capillary.
5. Use of a hand-held hot air gun at joint area prior to rolling membrane to maximize adhesion. Apply a bead of Flashing Bond or Garla-Flex, at all HPR SA FR Base Sheet side and end laps to eliminate a capillary.
6. Use a heavy, weighted roller over the entire surface of HPR SA FR Base Sheet to secure it in place and prevent voids, working outward from center of sheet.
7. Repeat the above steps to properly build 1 to 2 plies, as specified, of HPR SA FR Base Sheet.
8. Don't leave the installed HPR SA FR Base Sheet exposed to the weather; cover with StressPly SA FR Mineral cap sheet the same day.

C. Modified Cap Ply(s): Prior to installation sweep or blow away any dust, dirt or sand particles, on the HPR SA FR Base Sheet that could interfere with adhesion.

1. Install StressPly SA FR Mineral starting at the low point of the roof with an appropriate roll width to offset sidelaps from the underlying membrane a minimum of 18 inches (457 mm). Work with manageable lengths for proper handling. Position with salvage edge release strip at high side of roof. Install in shingle fashion, with no laps against the flow of water.
2. Once positioned, lift and fold back lengthwise the lower half of the membrane, remove the split release film, and press firmly into place. Repeat with the other (high side of the roof) half of the membrane. Follow the same layout and split release film procedures as for HPR SA FR Base Sheet, but overlap sidelaps 4 inches (100 mm) and endlaps 8 inches (203 mm).
3. Use a heavy, weighted roller over the entire surface of the StressPly SA FR Mineral sheet to secure it in place and prevent voids, working outward from the center of the sheet.
4. As subsequent membrane lengths are installed, remove the selvage edge release strip just prior to overlapping to keep the adhesive area protected and clean. Cut endlaps at opposing diagonal corners at a 45 degree angle approximately 4 inches (100 mm) from the corners to minimize "T" seams. Use Flashing Bond or Garla-Flex trowel grade, over the full 8 inch (200 mm) width of each endlap prior to overlapping. Apply a uniform 1/8 to 1/4 inch (3 to 6 mm) troweling of the Flashing Bond or Garla-Flex the full width of the endlaps to the underlying membrane; then install the overlapping sheet.

5. Always apply Flashing Bond or Garla-Flex the width of any overlap when applying the StressPly SA FR Mineral cap over another mineral surface such as the StressPly SA FR Mineral endlap.
6. Install HPR SA FR Base Sheet and StressPly SA FR Mineral at vertical and other flashing over the already installed StressPly SA FR Mineral field plies.

D. Fibrous Cant Strips: Provide non-combustible perlite or glass fiber cant strips at all wall/curb detail treatments where angle changes are greater than 45 degrees. Cant may be set in approved cold adhesives in accordance with Garland's recommendations.

E. Metal Work: Provide metal flashings, counter flashings, parapet coping caps and thru-wall flashings as specified in Section 07620 or Section 07710. Install in accordance with in accordance with Garland's recommendations.

F. Termination Bar: Provide metal termination bar or approved top edge securement at the terminus of all flashing sheets at walls and curbs. Fasten the bar a minimum of 8 inches (203 mm) o/c to achieve constant compression. Provide suitable, sealant at the top edge if required.

G. Flashing Base Ply: At all vertical and other flashing details, install HPR SA FR Base Sheet and StressPly SA FR Mineral over the already installed StressPly SA FR Mineral field plies.
1. Prime the horizontal surface with SA Primer at a rate of 0.5 gal per 100 sq.ft. and allowed to dry.
2. Over installed StressPly SA FR Mineral field plies apply a 3 foot (0.9 m) wide HPR SA FR Base Sheet extending a minimum of 10 inches (254 mm) onto the field of the roof. Apply a uniform 1/8 to 1/4 inch (3 to 6 mm) thick troweling of Flashing Bond or Garla-Flex, on to the existing StressPly SA FR Mineral field cap.
3. If adhesion is not sufficient on the laps apply Flashing Bond or Garla-Flex at a 1/8 to 1/4 inch (3-6 mm) thick to fully seal laps before application of StressPly SA FR Mineral.
4. Before installing StressPly SA FR Mineral flashing ply to mineral surfaced field ply, apply Flashing Bond or Garla-Flex, wherever the membrane overlaps onto mineral surfacing. Proceed with StressPly SA FR Mineral cap sheet installation. Apply a 3 foot (0.9 m) wide StressPly SA FR mineral extending a minimum of 10 inches (254 mm) onto the field of the roof, being sure to cover the base ply.
5. Once the membrane has had a chance to bond, check all laps and joints for full adhesion. If the membrane can be lifted at any area it is not properly adhered. Use a seam probing tool to check for small voids at laps. If necessary, use appropriate hand-held hot air welding tool and seam roller to seal small un-bonded areas.

H. Flashing Cap Ply: Apply as specified for Flashing Base Ply in strict conformance with the manufacturer's recommended procedures.

3.5 CLEANING

A. Clean-up and remove daily from the site all wrappings, empty containers, paper, loose particles and other debris resulting from these operations.

B. Remove asphalt markings from finished surfaces.

C. Repair or replace defaced or disfigured finishes caused by Work of this section.

3.6 PROTECTION

A. Provide traffic ways, erect barriers, fences, guards, rails, enclosures, chutes and the like to protect personnel, roofs and structures, vehicles and utilities.

B. Protect exposed surfaces of finished walls with tarps to prevent damage.

C. Plywood for traffic ways required for material movement over existing roofs shall be not less than 5/8 inch (16 mm) thick.

D. In addition to the plywood listed above, an underlayment of minimum 1/2 inch (13 mm) recover board is required on new roofing.

E. Special permission shall be obtained from the Manufacturer before any traffic shall be permitted over new roofing.

3.7 FIELD QUALITY CONTROL

A. Inspection: Provide manufacturer's field observations 3 days per week. Provide a final inspection upon completion of the Work.
   1. Warranty shall be issued upon manufacturer's acceptance of the installation.
   2. Field observations shall be performed by a Sales Representative employed full-time by the manufacturer and whose primary job description is to assist, inspect and approve membrane installations for the manufacturer.
   3. Provide observation reports from the Sales Representative indicating procedures followed, weather conditions and any discrepancies found during inspection.
   4. Provide a final report from the Sales Representative, certifying that the roofing system has been satisfactorily installed according to the project specifications, approved details and good general roofing practice.

3.8 SCHEDULES

A. Surfacing:
   1. Flashing Cap (Ply) Sheet:
      a. StressPly SA FR Mineral: 140 mil SBS (Styrene-Butadiene-Styrene) mineral surfaced self-adhered, rubber modified roofing membrane reinforced with a fiberglass and polyester composite scrim. ASTM D 6162, Type III Grade G
         1) Tensile Strength, ASTM D 5147
            a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 310 lbf/in XD 310 lbf/in
            b) 50 mm/min. @ 23 +/- 2 deg. C MD 54.25 kN/m XD 54.25 kN/m
         2) Tear Strength, ASTM D 5147
            a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 500 lbf XD 500 lbf
            b) 50 mm/min. @ 23 +/- 2 deg. C MD 2224 N XD 2224 N
         3) Elongation at Maximum Tensile, ASTM D 5147
            a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 3.5% XD 3.5%
            b) 50 mm/min. @ 23 +/- 2 deg. C MD 3.5% XD 3.5%
         4) Low Temperature Flexibility, ASTM D 5147, Passes -15 deg. F (-26 deg. C)

END OF SECTION

SECTION 07553
TWO PLY HOT ASPHALT MODIFIED ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Hot Applied 2-Ply Asphalt Roofing

1.2 REFERENCES

A. ASTM D 5147 Standard Test Method for Sampling and Testing Modified Bituminous Sheet Materials.

B. ASTM D 6162 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.

C. ASTM D 6163 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.

D. ASTM D 6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

E. ASTM E 108 - Standard Test Methods for Fire Test of Roof Coverings

F. Factory Mutual Research (FM): Roof Assembly Classifications.

G. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.

H. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.

I. Underwriters Laboratories, Inc. (UL): Fire Hazard Classifications.

J. Warnock Hersey (WH): Fire Hazard Classifications.

K. ANSI-SPRI ES-1 Wind Design Standard for Edge Systems used with Low Slope Roofing Systems.

L. ASCE 7, Minimum Design Loads for Buildings and Other Structures

M. UL - Fire Resistance Directory.

N. FM Approvals - Roof Coverings and/or RoofNav assembly database.

O. California Title 24 Energy Efficient Standards.

1.3 DESIGN / PERFORMANCE REQUIREMENTS

A. Perform work in accordance with all federal, state and local codes.

B. Exterior Fire Test Exposure: Roof system shall achieve a UL, FM or WH Class A rating for roof slopes

1.4 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation instructions.

B. Shop Drawings: Submit shop drawings including installation details of roofing, flashing, fastening, insulation and vapor barrier, including notation of roof slopes and fastening patterns of insulation and base modified bitumen membrane, prior to job start.

C. Design Pressure Calculations: Submit design pressure calculations for the roof area in accordance with ASCE 7 and local Building Code requirements. Include a roof system attachment analysis report, certifying the system's compliance with applicable wind load requirements before Work begins. Report shall be signed and sealed by a Professional Engineer registered in the State of the Project who has provided roof system attachment analysis for not less than 5 consecutive years.

D. Verification Samples: For each modified bituminous membrane ply product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

E. Manufacturer's Certificates: Provide to certify products meet or exceed specified requirements.

F. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM D5147. Testing must be performed at 77 deg. F. Tests at 0 deg. F will not be considered.

G. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM D5147.

H. Manufacturer's Fire Compliance Certificate: Certify that the roof system furnished is approved by Factory Mutual (FM), Underwritters Laboratories (UL), Warnock Hersey (WH) or approved third party testing facility in accordance with ASTM E108, Class A for external fire and meets local or nationally recognized building codes.

I. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic inspection and maintenance of all completed roofing work. Provide product warranty executed by the manufacturer. Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified with documented ISO 9001 certification and minimum of twelve years of documented experience and must not have been in Chapter 11 bankruptcy during the last five years.

C. Installer Qualifications: Company specializing in performing Work of this section with minimum five years documented experience and a certified Pre-Approved Garland Contractor.

D. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress.

E. Product Certification: Provide manufacturer's certification that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof

system specified herein.

F. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.

1.6 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to commencing Work of this section.

B. Review installation procedures and coordination required with related Work.

C. Inspect and make notes of job conditions prior to installation:
   1. Record minutes of the conference and provide copies to all parties present.
   2. Identify all outstanding issues in writing designating the responsible party for follow-up action and the timetable for completion.
   3. Installation of roofing system shall not begin until all outstanding issues are resolved to the satisfaction of the Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging with labels intact until ready for installation.

B. Store all roofing materials in a dry place, on pallets or raised platforms, out of direct exposure to the elements until time of application. Store materials at least 4 inches above ground level and covered with "breathable" tarpaulins.

C. Stored in accordance with the instructions of the manufacturer prior to their application or installation. Store roll goods on end on a clean flat surface except store KEE-Stone FB 60 rolls flat on a clean flat surface. No wet or damaged materials will be used in the application.

D. Store at room temperature wherever possible, until immediately prior to installing the roll. During winter, store materials in a heated location with a 50 degree F (10 degree C) minimum temperature, removed only as needed for immediate use. Keep materials away from open flame or welding sparks.

E. Avoid stockpiling of materials on roofs without first obtaining acceptance from the Architect/Engineer.

F. Adhesive storage shall be between the range of above 50 degree F (10 degree C) and below 80 degree F (27 degree C). Area of storage shall be constructed for flammable storage.

1.8 COORDINATION

A. Coordinate Work with installing associated metal flashings as work of this section proceeds.

1.9 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Garland Company or District pre-approved equal. Local contact: Steve Lampman 949-322-1770

B. 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 coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.
      d. Will waive all claims for additional cost related to substitution, which consequently become apparent.
      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 contractors request for manufacturer substitution.

2.2 HOT APPLIED 2-PLY ASPHALT ROOFING - STRESSPLY, OPTIMAX, OR VERSIPLY

A. Nailable Base Sheet: One ply fastened to the deck per wind uplift calculations.
   1. HPR Glasbase:

B. Base (Ply) Sheet: One ply bonded to the prepared substrate with Interply Adhesive:
   1. StressBase 80:

C. Modified Cap (Ply) Sheet: One ply bonded to the prepared substrate with Interply Adhesive.
   1. StressPly Plus FR Mineral:

D. Interply Adhesive: (1 and 2)
   1. Generic Type III Asphalt:

E. Flashing Base Ply: One ply bonded to the prepared substrate with Interply Adhesive: except torch sheet.
   1. VersiPly 40:

F. Flashing Cap (Ply) Sheet: One ply bonded to the prepared substrate with Interply Adhesive: except torch sheet.
   1. StressPly Plus FR Mineral:

G. Flashing Ply Adhesive:

1. Generic Type IV Asphalt:

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Inspect and approve the deck condition, slopes and fastener backing if applicable, parapet walls, expansion joints, roof drains, stack vents, vent outlets, nailers and surfaces and elements.

C. Verify that work penetrating the roof deck, or which may otherwise affect the roofing, has been properly completed.

D. If substrate preparation and other conditions are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. General: Clean surfaces thoroughly prior to installation.
1. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
2. Fill substrate surface voids that are greater than 1/4 inch wide with an acceptable fill material.
3. Roof surface to receive roofing system shall be smooth, clean, free from loose gravel, dirt and debris, dry and structurally sound.
4. Wherever necessary, all surfaces to receive roofing materials shall be power broom and vacuumed to remove debris and loose matter prior to starting work.
5. Do not apply roofing during inclement weather. Do not apply roofing membrane to damp, frozen, dirty, or dusty surfaces.
6. Fasteners and plates for fastening components mechanically to the substrate shall provide a minimum pull-out capacity of 300 lbs. (136 k) per fastener. Base or ply sheets attached with cap nails require a minimum pullout capacity of 40 lb. per nail.
7. Prime decks where required, in accordance with requirements and recommendations of the primer and deck manufacturer.

3.3 INSTALLATION - GENERAL

A. Install modified bitumen membranes and flashings in accordance with manufacturer's instructions and with the recommendations provided by the National Roofing Contractors Association's Roofing & Waterproofing Manual, the Asphalt Roofing Manufacturers Association, and applicable codes.

B. General: Avoid installation of modified bitumen membranes at temperatures lower than 40-45 degrees F. When work at such temperatures unavoidable use the following precautions:
1. Take extra care during cold weather installation and when ambient temperatures are affected by wind or humidity, to ensure adequate bonding is achieved between the surfaces to be joined. Use extra care at material seam welds and where adhesion of the applied product to the appropriately prepared substrate as the substrate can be affected by such temperature constraints as well.
2. Unrolling of cold materials, under low ambient conditions must be avoided to prevent the likelihood of unnecessary stress cracking. Rolls must be at least 40 degrees F at the time of application. If the membrane roll becomes stiff or difficult to install, it must be replaced with roll from a heated storage area.

C. Commence installation of the roofing system at the lowest point of the roof (or roof area),

working up the slope toward the highest point. Lap sheets shingle fashion so as to constantly shed water

D. All slopes greater than 2:12 require back-nailing to prevent slippage of the ply sheets. Use ring or spiral-shank 1 inch cap nails, or screws and plates at a rate of 1 fastener per ply (including the membrane) at each insulation stop. Place insulation stops at 16 ft o.c. for slopes less than 3:12 and 4 feet o.c. for slopes greater than 3:12. On non-insulated systems, nail each ply directly into the deck at the rate specified above. When slope exceeds 2:12, install all plies parallel to the slope (strapping) to facilitate backnailing. Install 4 additional fasteners at the upper edge of the membrane when strapping the plies.

3.4 INSTALLATION HOT APPLIED ROOF SYSTEM

A. Base/Felt Ply(s): Install base sheet or felt plies in twenty five (25) lbs (11.3kg) per square of bitumen shingled uniformly to achieve one or more plies over the entire prepared substrate. Shingle in direction of slope of roof to shed water on each area of roof. Do not step on base rolls until asphalt has cooled, fish mouths should be cut and patched.
   1. Lap ply sheet ends 8 inches (203 mm). Stagger end laps 2 inches (304mm) minimum.
   2. Install base flashing ply to all perimeter and projection details after membrane application.
   3. Extend plies 2 inches beyond top edges of cants at wall and projection bases.
   4. Install base flashing ply to all perimeter and projection details.
   5. Allow the one ply of base sheet to cure at least 30 minutes before installing the modified membrane. However, the modified membrane must be installed the same day as the base plies.

B. Modified Cap Ply(s): Solidly bond the modified membrane to the base layers with specified material at the rate of 25 to thirty 30 lbs. (11-13kg) per 100 square feet.
   1. Roll must push a puddle of hot material in front of it with material slightly visible at all side laps. Use care to eliminate air entrapment under the membrane. Exercise care during application to eliminate air entrapment under the membrane.
   2. Apply pressure to all seams to ensure that the laps are solidly bonded to substrate.
   3. Install subsequent rolls of modified membrane as above with a minimum of 4 inch (101 mm) side laps and 8 inch (203 mm) end laps. Stagger end laps. Apply 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. Apply hot material no more than 5 feet (1.5 m) ahead of each roll being embedded.
   5. Extend membrane 2 inches (50 mm) beyond top edge of all cants in full moppings of the specified hot material.

C. Fibrous Cant Strips: Provide non-combustible perlite or glass fiber cant strips at all wall/curb detail treatments where angle changes are greater than 45 degrees. Cant may be set in approved cold adhesives, hot asphalt or mechanically attached with approved plates and fasteners.

D. Wood Blocking, Nailers and Cant Strips: Provide wood blocking, nailers and cant strips as specified in Section 06114.
   1. Provide nailers at all roof perimeters and penetrations for fastening membrane flashings and sheet metal components.
   2. Wood nailers should match the height of any insulation, providing a smooth and even transition between flashing and insulation areas.
   3. Nailer lengths should be spaced with a minimum 1/8 inch gap for expansion and contraction between each length or change of direction.
   4. Nailers and flashings should be fastened in accordance with Factory Mutual "Loss Prevention Data Sheet 1- 49, Perimeter Flashing" and be designed to be capable of resisting a minimum force of 200 lbs/lineal foot in any direction.

E. Metal Work: Provide metal flashings, counter flashings, parapet coping caps and thru-wall flashings as specified in Section 07620 or Section 07710. Install in accordance with the SMACNA "Architectural Sheet Metal Manual" or the NRCA Roofing Waterproofing manual.

F. Termination Bar: Provide a metal termination bar or approved top edge securement at the terminus of all flashing sheets at walls and curbs. Fasten the bar a minimum of 8 inches (203 mm) o/c to achieve constant compression. Provide suitable, sealant at the top edge if required.

G. Flashing Base Ply: Install flashing sheets by the same application method used for the base ply.
   1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
   2. Prepare all walls, penetrations, expansion joints and surfaces to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
   3. Adhere to the underlying base flashing ply with specified hot material unless otherwise noted in these specifications. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
   4. Solidly adhere the entire sheet of flashing membrane to the substrate.
   5. Seal all vertical laps of flashing membrane with a three-course application of trowel-grade mastic and mesh.
   6. Coordinate counter flashing, cap flashings, expansion joints, and similar work with modified bitumen roofing work as specified.
   7. Coordinate roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices with the roofing system work.

H. Flashing Cap Ply: Install flashing cap sheets by the same application method used for the cap ply.
   1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
   2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
   3. Adhere to the underlying base flashing ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
   4. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.
   5. Coordinate roof accessories, miscellaneous sheet metal accessory items with the roofing system work.
   6. All stripping shall be installed prior to flashing cap sheet installation.
   7. Heat and scrape granules when welding or adhering at cut areas and seams to granular surfaces at all flashings.
   8. Secure the top edge of the flashing sheet using a termination bar only when the wall surface above is waterproofed, or nailed 4 inches on center and covered with an acceptable counter flashing.

I. Roof Walkways: Provide walkways in areas indicated on the Drawings.

3.5 CLEANING

A. Clean-up and remove daily from the site all wrappings, empty containers, paper, loose particles and other debris resulting from these operations.

B. Remove asphalt markings from finished surfaces.

C. Repair or replace defaced or disfigured finishes caused by Work of this section.

3.6 PROTECTION

A. Provide traffic ways, erect barriers, fences, guards, rails, enclosures, chutes and the like to protect personnel, roofs and structures, vehicles and utilities.

B. Protect exposed surfaces of finished walls with tarps to prevent damage.

C. Plywood for traffic ways required for material movement over existing roofs shall be not less than 5/8 inch (16 mm) thick.

D. In addition to the plywood listed above, an underlayment of minimum 1/2 inch (13 mm) recover board is required on new roofing.

E. Special permission shall be obtained from the Manufacturer before any traffic shall be permitted over new roofing.

3.7 FIELD QUALITY CONTROL

A. Inspection: Provide manufacturer's field observations 3 days per week. Provide a final inspection upon completion of the Work.
   1. Warranty shall be issued upon manufacturer's acceptance of the installation.
   2. Field observations shall be performed by a Sales Representative employed full-time by the manufacturer and whose primary job description is to assist, inspect and approve membrane installations for the manufacturer.
   3. Provide observation reports from the Sales Representative indicating procedures followed, weather conditions and any discrepancies found during inspection.
   4. Provide a final report from the Sales Representative, certifying that the roofing system has been satisfactorily installed according to the project specifications, approved details and good general roofing practice.

3.8 SCHEDULES

A. Base (Ply) Sheet:
   1. StressBase 80: 80 mil SBS (Styrene-Butadiene-Styrene) rubber modified roofing base sheet reinforced with a fiberglass scrim, performance requirements according to ASTM D 5147.
      a. Tensile Strength, ASTM D 5147
         1) 2 in/min. @ 0 +/- 3.6 deg. F MD 100 lbf/in XD 100 lbf/in
         2) 50mm/min. @ -17.78 +/- 2 deg. C MD 17.5 kN/m XD 17.5 kN/m
      b. Tear Strength, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 110 lbf XD 100 lbf
         2) 50mm/min. @ 23 +/- 2 deg. C MD 489 N XD 444 N
      c. Elongation at Maximum Tensile, ASTM D 5147
         1) 2 in/min. @ 0 +/- 3.6 deg. F MD 4 % XD 4 %
         2) 50mm/min@ -17.78 +/- 2 deg. C MD 4 % XD 4 %
      d. Low Temperature Flexibility, ASTM D 5147, Passes -40 deg. F (-40 deg. C)

B. Modified Cap (Ply) Sheet:
   1. StressPly Plus FR Mineral: 155 mil SBS (Styrene-Butadiene-Styrene) mineral surfaced, rubber modified roofing membrane reinforced with a fiberglass and polyester composite scrim. ASTM D 6162, Type III Grade G
      a. Tensile Strength, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 310 lbf/in XD 310 lbf/in
         2) 50 mm/min. @ 23 +/- 2 deg. C MD 54.25 kN/m XD 54.25 kN/m
      b. Tear Strength, ASTM D 5147

1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 500 lbf XD 500 lbf
2) 50 mm/min. @ 23 +/- 2 deg. C MD 2224 N XD 2224 N

c. Elongation at Maximum Tensile, ASTM D 5147
1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 8% XD 8%
2) 50 mm/min. @ 23 +/- 2 deg. C MD 8% XD 8%

d. Low Temperature Flexibility, ASTM D 5147, Passes -30 deg. F (-34 deg. C)

C. Interply Adhesive:
1. Generic Type III Asphalt: Hot Bitumen, ASTM D 312, Type III steep asphalt having the following characteristics:
a. Softening Point 185 deg. F - 205 deg. F
b. Flash Point 500 deg. F
c. Penetration @ 77 deg. F 15-35 units
d. Ductility @ 77 deg. F 2.5 cm

D. Flashing Base Ply:
1. VersiPly 40: 40 mil SBS (Styrene-Butadiene-Styrene) rubber modified roofing base sheet with dual fiberglass reinforced scrim.
a. Tensile Strength, ASTM D 5147
1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 215 lbf/in XD 215 lbf/in
2) 50 mm/min. @ 23 +/- 2 deg. C MD 37.5 kN/m XD 37.5 kN/m

b. Tear Strength, ASTM D 5147
1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 275 lbf XD 275 lbf
2) 50 mm/min. @ 23 +/- 2 deg. C MD 1223 N XD 1223 N

c. Elongation at Maximum Tensile, ASTM D 5147
1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 4.5% XD 4.5%
2) 50 mm/min. @ 23 +/- 2 deg. C MD 4.5% XD 4.5%

d. Low Temperature Flexibility, ASTM D 5147
1) Passes -30 deg. F (-34 deg. C). Meets or Exceeds ASTM D 4601 Type II Performance Criteria.

E. Flashing Ply Adhesive:
1. Generic Type IV Asphalt: Hot Bitumen, ASTM D 312, Type IV special steep asphalt having the following characteristics:
a. Softening Point 210 deg. F - 225 deg. F
b. Flash Point 500 deg. F
c. Penetration @ 77 deg. F 15-25 units
d. Ductility @ 77 deg. F 1.5 cm

F. Surfacing:
1. Flashing Cap (Ply) Sheet:
a. StressPly Plus FR Mineral: 155 mil SBS (Styrene-Butadiene-Styrene) mineral surfaced, rubber modified roofing membrane reinforced with a fiberglass and polyester composite scrim. ASTM D 6162, Type III Grade G
1) Tensile Strength, ASTM D 5147
a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 310 lbf/in XD 310 lbf/in
b) 50 mm/min. @ 23 +/- 2 deg. C MD 54.25 kN/m XD 54.25 kN/m

2) Tear Strength, ASTM D 5147
a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 500 lbf XD 500 lbf
b) 50 mm/min. @ 23 +/- 2 deg. C MD 2224 N XD 2224 N

3) Elongation at Maximum Tensile, ASTM D 5147
a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 8% XD 8%
b) 50 mm/min. @ 23 +/- 2 deg. C MD 8% XD 8%

4) Low Temperature Flexibility, ASTM D 5147, Passes -30 deg. F (-34 deg. C)

END OF SECTION

SECTION 07554
COLD PROCESS MODIFIED MEMBRANE ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cold Applied 2-Ply Asphalt Roofing

1.2 REFERENCES

A. ASTM D 5147 Standard Test Method for Sampling and Testing Modified Bituminous Sheet Materials.

B. ASTM D 6162 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.

C. ASTM D 6163 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.

D. ASTM D 6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

E. ASTM E 108 - Standard Test Methods for Fire Test of Roof Coverings

F. Factory Mutual Research (FM): Roof Assembly Classifications.

G. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.

H. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.

I. Underwriters Laboratories, Inc. (UL): Fire Hazard Classifications.

J. Warnock Hersey (WH): Fire Hazard Classifications.

K. ANSI-SPRI ES-1 Wind Design Standard for Edge Systems used with Low Slope Roofing Systems.

L. ASCE 7, Minimum Design Loads for Buildings and Other Structures

M. UL - Fire Resistance Directory.

N. FM Approvals - Roof Coverings and/or RoofNav assembly database.

O. California Title 24 Energy Efficient Standards.

1.3 DESIGN / PERFORMANCE REQUIREMENTS

A. Perform work in accordance with all federal, state and local codes.

B. Exterior Fire Test Exposure: Roof system shall achieve a UL, FM or WH Class A rating for roof slopes

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation instructions.

C. Shop Drawings: Submit shop drawings including installation details of roofing, flashing, fastening, insulation and vapor barrier, including notation of roof slopes and fastening patterns of insulation and base modified bitumen membrane, prior to job start.

D. Design Pressure Calculations: Submit design pressure calculations for the roof area in accordance with ASCE 7 and local Building Code requirements. Include a roof system attachment analysis report, certifying the system's compliance with applicable wind load requirements before Work begins. Report shall be signed and sealed by a Professional Engineer registered in the State of the Project who has provided roof system attachment analysis for not less than 5 consecutive years.

E. Verification Samples: For each modified bituminous membrane ply product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

F. Manufacturer's Certificates: Provide to certify products meet or exceed specified requirements.

G. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM D5147.

H. Manufacturer's Fire Compliance Certificate: Certify that the roof system furnished is approved by Factory Mutual (FM), Underwritters Laboratories (UL), Warnock Hersey (WH) or approved third party testing facility in accordance with ASTM E108, Class A for external fire and meets local or nationally recognized building codes.

I. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic inspection and maintenance of all completed roofing work. Provide product warranty executed by the manufacturer. Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified with documented ISO 9001 certification and minimum of twelve years of documented experience and must not have been in Chapter 11 bankruptcy during the last five years.

C. Installer Qualifications: Company specializing in performing Work of this section with minimum five years documented experience and a certified Pre-Approved Garland Contractor.

D. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress.

E. Product Certification: Provide manufacturer's certification that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.

F. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.

1.6 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to commencing Work of this section.

B. Review installation procedures and coordination required with related Work.

C. Inspect and make notes of job conditions prior to installation:
   1. Record minutes of the conference and provide copies to all parties present.
   2. Identify all outstanding issues in writing designating the responsible party for follow-up action and the timetable for completion.
   3. Installation of roofing system shall not begin until all outstanding issues are resolved to the satisfaction of the Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging with labels intact until ready for installation.

B. Store all roofing materials in a dry place, on pallets or raised platforms, out of direct exposure to the elements until time of application. Store materials at least 4 inches above ground level and covered with "breathable" tarpaulins.

C. Stored in accordance with the instructions of the manufacturer prior to their application or installation. Store roll goods on end on a clean flat surface except store KEE-Stone FB 60 rolls flat on a clean flat surface. No wet or damaged materials will be used in the application.

D. Store at room temperature wherever possible, until immediately prior to installing the roll. During winter, store materials in a heated location with a 50 degree F (10 degree C) minimum temperature, removed only as needed for immediate use. Keep materials away from open flame or welding sparks.

E. Avoid stockpiling of materials on roofs without first obtaining acceptance from the Architect/Engineer.

F. Adhesive storage shall be between the range of above 50 degree F (10 degree C) and below 80 degree F (27 degree C). Area of storage shall be constructed for flammable storage.

1.8 COORDINATION

A. Coordinate Work with installing associated metal flashings as work of this section proceeds.

1.9 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Garland Company or District pre-approved equal. Local contact: Steve Lampman 949-322-1770

B. 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 coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.
      d. Will waive all claims for additional cost related to substitution, which consequently become apparent.
      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 contractors request for manufacturer substitution.

2.2 COLD APPLIED 2-PLY ROOF SYSTEM - STRESSPLY, OPTIMAX, OR VERSIPLY

A. Nailable Base Sheet: One ply fastened to the deck per wind uplift calculations.
   1. HPR Glasbase

B. Base (Ply) Sheet: One ply bonded to the prepared substrate with Interply Adhesive:
   1. StressBase 80:

C. Modified Cap (Ply) Sheet: One ply bonded to the prepared substrate with Interply Adhesive:
   1. StressPly Plus FR Mineral:

D. Interply Adhesive: (1 and 2)
   1. Weatherking Plus WC:

E. Flashing Base Ply: One ply bonded to the prepared substrate with Interply Adhesive:
   1. StressBase 80:

F. Flashing Cap (Ply) Sheet: One ply bonded to the prepared substrate with Interply Adhesive:
   1. StressPly Plus FR Mineral:

G. Flashing Ply Adhesive:
   1. Weatherking Flashing Adhesive:

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Inspect and approve the deck condition, slopes and fastener backing if applicable, parapet walls, expansion joints, roof drains, stack vents, vent outlets, nailers and surfaces and elements.

C. Verify that work penetrating the roof deck, or which may otherwise affect the roofing, has been properly completed.

D. If substrate preparation and other conditions are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. General: Clean surfaces thoroughly prior to installation.
   1. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
   2. Fill substrate surface voids that are greater than 1/4 inch wide with an acceptable fill material.
   3. Roof surface to receive roofing system shall be smooth, clean, free from loose gravel, dirt and debris, dry and structurally sound.
   4. Wherever necessary, all surfaces to receive roofing materials shall be power broom and vacuumed to remove debris and loose matter prior to starting work.
   5. Do not apply roofing during inclement weather. Do not apply roofing membrane to damp, frozen, dirty, or dusty surfaces.
   6. Fasteners and plates for fastening components mechanically to the substrate shall provide a minimum pull-out capacity of 300 lbs. (136 k) per fastener. Base or ply sheets attached with cap nails require a minimum pullout capacity of 40 lb. per nail.
   7. Prime decks where required, in accordance with requirements and recommendations of the primer and deck manufacturer.

3.3 INSTALLATION - GENERAL

A. Install modified bitumen membranes and flashings in accordance with manufacturer's instructions and with the recommendations provided by the National Roofing Contractors Association's Roofing & Waterproofing Manual, the Asphalt Roofing Manufacturers Association, and applicable codes.

B. General: Avoid installation of modified bitumen membranes at temperatures lower than 40-45 degrees F. When work at such temperatures unavoidable use the following precautions:
   1. Take extra care during cold weather installation and when ambient temperatures are affected by wind or humidity, to ensure adequate bonding is achieved between the surfaces to be joined. Use extra care at material seam welds and where adhesion of the applied product to the appropriately prepared substrate as the substrate can be affected by such temperature constraints as well.
   2. Unrolling of cold materials, under low ambient conditions must be avoided to prevent the likelihood of unnecessary stress cracking. Rolls must be at least 40 degrees F at the time of application. If the membrane roll becomes stiff or difficult to install, it must be replaced with roll from a heated storage area.

C. Commence installation of the roofing system at the lowest point of the roof (or roof area), working up the slope toward the highest point. Lap sheets shingle fashion so as to constantly shed water

D. All slopes greater than 2:12 require back-nailing to prevent slippage of the ply sheets. Use

ring or spiral-shank 1 inch cap nails, or screws and plates at a rate of 1 fastener per ply (including the membrane) at each insulation stop. Place insulation stops at 16 ft o.c. for slopes less than 3:12 and 4 feet o.c. for slopes greater than 3:12. On non-insulated systems, nail each ply directly into the deck at the rate specified above. When slope exceeds 2:12, install all plies parallel to the slope (strapping) to facilitate backnailing. Install 4 additional fasteners at the upper edge of the membrane when strapping the plies.

3.4 INSTALLATION COLD APPLIED ROOF SYSTEM

A. Base Ply: Cut base ply sheets into 18 foot lengths and allow plies to relax before installing. Install base sheet in Interply Adhesive: applied at the rate required by the manufacturer. Shingle base sheets uniformly to achieve one ply throughout over the prepared substrate. Shingle in proper direction to shed water on each large area of roofing.
   1. Lap ply sheet ends 8 inches. Stagger end laps 12 inches minimum.
   2. Solidly bond to the substrate and adjacent ply with specified cold adhesive at the rate of 2 to 2-1/2 gallons per 100 square feet.
   3. Roll must push a puddle of adhesive in front of it with adhesive slightly visible at all side laps. Use care to eliminate air entrapment under the membrane.
   4. Install subsequent rolls of modified across the roof as above with a minimum of 4 inch side laps and 8 inch staggered end laps. Lay modified membrane in the same direction as the underlayers but the laps shall not coincide with the laps of the base layers.
   5. Extend plies 2 inches beyond top edges of cants at wall and projection bases.
   6. Install base flashing ply to all perimeter and projection details.
   7. Allow the one ply of base sheet to cure at least 30 minutes before installing the modified membrane. However, the modified membrane must be installed the same day as the base plies.

B. Modified Cap Ply(s): Cut cap ply sheets into 18 foot lengths and allow plies to relax before installing. Install in interplay adhesive applied at the rate required by the manufacturer. Shingle sheets uniformly over the prepared substrate to achieve the number of plys specified. Shingle in proper direction to shed water on each large area of roofing.
   1. Lap ply sheet ends 8 inches. Stagger end laps 12 inches minimum.
   2. Solidly bond to the base layers with specified cold adhesive at the rate of 2 to 2-1/2 gallons per 100 square feet.
   3. Roll must push a puddle of adhesive in front of it with adhesive slightly visible at all side laps. Care should be taken to eliminate air entrapment under the membrane.
   4. Install subsequent rolls of modified across the roof as above with a minimum of 4 inch side laps and 8 inch staggered end laps. Lay modified membrane in the same direction as the underlayers but the laps shall not coincide with the laps of the base layers.
   5. Allow cold adhesive to set for 5 to 10 minutes before installing the top layer of modified membrane.
   6. Extend membrane 2 inches beyond top edge of all cants in full moppings of the cold adhesive as shown on the Drawings.

C. Fibrous Cant Strips: Provide non-combustible perlite or glass fiber cant strips at all wall/curb detail treatments where angle changes are greater than 45 degrees. Cant may be set in approved cold adhesives, hot asphalt or mechanically attached with approved plates and fasteners.

D. Wood Blocking, Nailers and Cant Strips: Provide wood blocking, nailers and cant strips as specified in Section 06114.
   1. Provide nailers at all roof perimeters and penetrations for fastening membrane flashings and sheet metal components.
   2. Wood nailers should match the height of any insulation, providing a smooth and even transition between flashing and insulation areas.

3. Nailer lengths should be spaced with a minimum 1/8 inch gap for expansion and contraction between each length or change of direction.
4. Nailers and flashings should be fastened in accordance with Factory Mutual "Loss Prevention Data Sheet 1- 49, Perimeter Flashing" and be designed to be capable of resisting a minimum force of 200 lbs/lineal foot in any direction.

E. Metal Work: Provide metal flashings, counter flashings, parapet coping caps and thru-wall flashings as specified in Section 07620 or Section 07710. Install in accordance with the SMACNA "Architectural Sheet Metal Manual" or the NRCA Roofing Waterproofing manual.

F. Termination Bar: Provide a metal termination bar or approved top edge securement at the terminus of all flashing sheets at walls and curbs. Fasten the bar a minimum of 8 inches (203 mm) o/c to achieve constant compression. Provide suitable, sealant at the top edge if required.

G. Flashing Base Ply: Install flashing sheets by the same application method used for the base ply.
1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
3. Adhere to the underlying base ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
4. Solidly adhere the entire flashing ply to the substrate. Secure the tops of all flashings that are not run up and over curb through termination bar fastened at 6 inches (152 mm) O.C. and sealed at top.
5. Seal all vertical laps of flashing ply with a three-course application of trowel-grade mastic and fiberglass mesh.
6. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.
7. Coordinate roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices with the roofing system work.
8. Secure the top edge of the flashing sheet using a termination bar only when the wall surface above is waterproofed, or nailed 4 inches on center and covered with an acceptable counter flashing.

H. Flashing Cap Ply:
1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
3. Adhere to the underlying base flashing ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
4. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.
5. Coordinate roof accessories, miscellaneous sheet metal accessory items with the roofing system work.
6. All stripping shall be installed prior to flashing cap sheet installation.
7. Heat and scrape granules when welding or adhering at cut areas and seams to granular surfaces at all flashings.

8. Secure the top edge of the flashing sheet using a termination bar only when the wall surface above is waterproofed, or nailed 4 inches on center and covered with an acceptable counter flashing.

I. Roof Walkways: Provide walkways in areas indicated on the Drawings.

3.5 CLEANING

A. Clean-up and remove daily from the site all wrappings, empty containers, paper, loose particles and other debris resulting from these operations.

B. Remove asphalt markings from finished surfaces.

C. Repair or replace defaced or disfigured finishes caused by Work of this section.

3.6 PROTECTION

A. Provide traffic ways, erect barriers, fences, guards, rails, enclosures, chutes and the like to protect personnel, roofs and structures, vehicles and utilities.

B. Protect exposed surfaces of finished walls with tarps to prevent damage.

C. Plywood for traffic ways required for material movement over existing roofs shall be not less than 5/8 inch (16 mm) thick.

D. In addition to the plywood listed above, an underlayment of minimum 1/2 inch (13 mm) recover board is required on new roofing.

E. Special permission shall be obtained from the Manufacturer before any traffic shall be permitted over new roofing.

3.7 FIELD QUALITY CONTROL

A. Inspection: Provide manufacturer's field observations 3 days per week. Provide a final inspection upon completion of the Work.
   1. Warranty shall be issued upon manufacturer's acceptance of the installation.
   2. Field observations shall be performed by a Sales Representative employed full-time by the manufacturer and whose primary job description is to assist, inspect and approve membrane installations for the manufacturer.
   3. Provide observation reports from the Sales Representative indicating procedures followed, weather conditions and any discrepancies found during inspection.
   4. Provide a final report from the Sales Representative, certifying that the roofing system has been satisfactorily installed according to the project specifications, approved details and good general roofing practice.

3.8 SCHEDULES

A. Base (Ply) Sheet:
   1. StressBase 80: 80 mil SBS (Styrene-Butadiene-Styrene) rubber modified roofing base sheet reinforced with a fiberglass scrim, performance requirements according to ASTM D 5147.
      a. Tensile Strength, ASTM D 5147
         1) 2 in/min. @ 0 +/- 3.6 deg. F MD 100 lbf/in XD 100 lbf/in
         2) 50mm/min. @ -17.78 +/- 2 deg. C MD 17.5 kN/m XD 17.5 kN/m
      b. Tear Strength, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 110 lbf XD 100 lbf
         2) 50mm/min. @ 23 +/- 2 deg. C MD 489 N XD 444 N
      c. Elongation at Maximum Tensile, ASTM D 5147

1) 2 in/min. @ 0 +/- 3.6 deg. F MD 4 % XD 4 %
2) 50mm/min@ -17.78 +/- 2 deg. C MD 4 % XD 4 %

d. Low Temperature Flexibility, ASTM D 5147, Passes -40 deg. F (-40 deg. C)

B. Thermoplastic/Modified Cap (Ply) Sheet:

1. StressPly Plus FR Mineral: 155 mil SBS (Styrene-Butadiene-Styrene) mineral surfaced, rubber modified roofing membrane reinforced with a fiberglass and polyester composite scrim. ASTM D 6162, Type III Grade G

a. Tensile Strength, ASTM D 5147
1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 310 lbf/in XD 310 lbf/in
2) 50 mm/min. @ 23 +/- 2 deg. C MD 54.25 kN/m XD 54.25 kN/m

b. Tear Strength, ASTM D 5147
1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 500 lbf XD 500 lbf
2) 50 mm/min. @ 23 +/- 2 deg. C MD 2224 N XD 2224 N

c. Elongation at Maximum Tensile, ASTM D 5147
1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 8% XD 8%
2) 50 mm/min. @ 23 +/- 2 deg. C MD 8% XD 8%

d. Low Temperature Flexibility, ASTM D 5147, Passes -30 deg. F (-34 deg. C)

C. Interply Adhesive:

1. Weatherking Plus WC: Rubberized, polymer modified cold process asphalt roofing bitumen V.O.C. compliant ASTM D 3019. Performance Requirements:

a. Non-Volatile Content ASTM D 4479 78%
b. Density ASTM D1475 9.0 lbs./gal.
c. Viscosity Stormer ASTM D562 900-1100 grams
d. Flash Point ASTM D 93 100 deg. F min. (37 deg. C)
e. Slope: up to 2:12
f. V.O.C. ASTM D 3960 Less than 250 g/l
g. Flash Point ASTM D 93 105 deg. F
h. Slope maximum 1:12

D. Flashing Base Ply:

1. StressBase 80: 80 mil SBS (Styrene-Butadiene-Styrene) rubber modified roofing base sheet reinforced with a fiberglass scrim, performance requirements according to ASTM D 5147.

a. Tensile Strength, ASTM D 5147
1) 2 in/min. @ 0 +/- 3.6 deg. F MD 100 lbf/in XD 100 lbf/in
2) 50 mm/min. @ -17.78 +/- 2 deg. C MD 17.5 kN/m XD 17.5 kN/m

b. Tear Strength, ASTM D 5147
1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 110 lbf XD 100 lbf
2) 50 mm/min. @ 23 +/- 2 deg. C MD 489 N XD 444 N

c. Elongation at Maximum Tensile, ASTM D 5147
1) 2 in/min. @ 0 +/- 3.6 deg. F MD 4 % XD 4 %
2) 50 mm/min. @ -17.78 +/- 2 deg. C MD 4 % XD 4 %

d. Low Temperature Flexibility, ASTM D 5147
1) Passes -40 deg. F (-40 deg. C)

E. Flashing Ply Adhesive:

1. Weatherking Flashing Adhesive: Brush grade flashing adhesive.

a. Non-Volatile Content ASTM D 4479 70 min.
b. Density ASTM D 1475 8.6 lbs./gal. (1kg/l)
c. Flash Point ASTM D 93 100 deg. F (37 deg. C)

F. Surfacing:

1. Flashing Cap (Ply) Sheet:

a. StressPly Plus FR Mineral: 155 mil SBS (Styrene-Butadiene-Styrene) mineral surfaced, rubber modified roofing membrane reinforced with a fiberglass and

polyester composite scrim. ASTM D 6162, Type III Grade G

1) Tensile Strength, ASTM D 5147
   a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 310 lbf/in XD 310 lbf/in
   b) 50 mm/min. @ 23 +/- 2 deg. C MD 54.25 kN/m XD 54.25 kN/m
2) Tear Strength, ASTM D 5147
   a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 500 lbf XD 500 lbf
   b) 50 mm/min. @ 23 +/- 2 deg. C MD 2224 N XD 2224 N
3) Elongation at Maximum Tensile, ASTM D 5147
   a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 8% XD 8%
   b) 50 mm/min. @ 23 +/- 2 deg. C MD 8% XD 8%
4) Low Temperature Flexibility, ASTM D 5147, Passes -30 deg. F (-34 deg. C)

END OF SECTION

SECTION 07555
THERMOPLASTIC HYBRID ROOF SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cold Applied 2-Ply Thermoplastic Hybrid Roof System

1.2 REFERENCES

A. ASTM D 5147 Standard Test Method for Sampling and Testing Modified Bituminous Sheet Materials.

B. ASTM D 6162 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.

C. ASTM D 6163 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.

D. ASTM D 6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

E. ASTM D 6754 - Standard Specification for Ketone Ethylene Ester (KEE) Sheet Roofing.

F. ASTM D 6757 - Standard Specification for Underlayment Felt Containing Inorganic Fibers Used in Steep-Slope Roofing.

G. ASTM E 108 - Standard Test Methods for Fire Test of Roof Coverings

H. Factory Mutual Research (FM): Roof Assembly Classifications.

I. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.

J. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.

K. Underwriters Laboratories, Inc. (UL): Fire Hazard Classifications.

L. Warnock Hersey (WH): Fire Hazard Classifications.

M. ANSI-SPRI ES-1 Wind Design Standard for Edge Systems used with Low Slope Roofing Systems.

N. ASCE 7, Minimum Design Loads for Buildings and Other Structures

O. UL - Fire Resistance Directory.

P. FM Approvals - Roof Coverings and/or RoofNav assembly database.

Q. California Title 24 Energy Efficient Standards.

1.3 DESIGN / PERFORMANCE REQUIREMENTS

A. Perform work in accordance with all federal, state and local codes.

B. Exterior Fire Test Exposure: Roof system shall achieve a UL, FM or WH Class A rating

1.4 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation instructions.

B. Shop Drawings: Submit shop drawings including installation details of roofing, flashing, fastening, insulation and vapor barrier, including notation of roof slopes and fastening patterns of insulation and base modified bitumen membrane, prior to job start.

C. Design Pressure Calculations: Submit design pressure calculations for the roof area in accordance with ASCE 7 and local Building Code requirements. Include a roof system attachment analysis report, certifying the system's compliance with applicable wind load requirements before Work begins. Report shall be signed and sealed by a Professional Engineer registered in the State of the Project who has provided roof system attachment analysis for not less than 5 consecutive years.

D. LEED Submittals: Provide documentation of how the requirements of Credit will be met:
   1. List of proposed materials with recycled content. Indicate post-consumer recycled content and pre-consumer recycled content for each product having recycled content.
   2. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.
   3. Product reflectivity and emissivity criteria to qualify for one point under the LEED credit category, Credit 7.2, Landscape & Exterior Design to Reduce Heat Island - Roof.

E. Recycled or Bio-Based Materials: Provide third party certification through UL Environment of roof System membranes containing recycled or bio based materials.

F. Verification Samples: For each modified bituminous membrane ply product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

G. Manufacturer's Certificates: Provide to certify products meet or exceed specified requirements.

H. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM D5147. Testing must be performed at 77 deg. F. Tests at 0 deg. F will not be considered.

I. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic inspection and maintenance of all completed roofing work. Provide product warranty executed by the manufacturer. Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified with documented ISO 9001 certification and minimum of twelve years of documented experience and must not have been in Chapter 11 bankruptcy during the last five years.

C. Installer Qualifications: Company specializing in performing Work of this section with

minimum five years documented experience and a certified Pre-Approved Garland Contractor.

D. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress.

E. Product Certification: Provide manufacturer's certification that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.

F. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.

1.6 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to commencing Work of this section.

B. Review installation procedures and coordination required with related Work.

C. Inspect and make notes of job conditions prior to installation:
1. Record minutes of the conference and provide copies to all parties present.
2. Identify all outstanding issues in writing designating the responsible party for follow-up action and the timetable for completion.
3. Installation of roofing system shall not begin until all outstanding issues are resolved to the satisfaction of the Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging with labels intact until ready for installation.

B. Store all roofing materials in a dry place, on pallets or raised platforms, out of direct exposure to the elements until time of application. Store materials at least 4 inches above ground level and covered with "breathable" tarpaulins.

C. Stored in accordance with the instructions of the manufacturer prior to their application or installation. Store roll goods on end on a clean flat surface except store KEE-Stone FB 60 rolls flat on a clean flat surface. No wet or damaged materials will be used in the application.

D. Store at room temperature wherever possible, until immediately prior to installing the roll. During winter, store materials in a heated location with a 50 degree F (10 degree C) minimum temperature, removed only as needed for immediate use. Keep materials away from open flame or welding sparks.

E. Avoid stockpiling of materials on roofs without first obtaining acceptance from the Architect/Engineer.

F. Adhesive storage shall be between the range of above 50 degree F (10 degree C) and below 80 degree F (27 degree C). Area of storage shall be constructed for flammable storage.

1.8 COORDINATION

A. Coordinate Work with installing associated metal flashings as work of this section proceeds.

1.9 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Garland Company or District pre-approved equal. Local contact: Steve Lampman 949-322-1770

B. 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 coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.
      d. Will waive all claims for additional cost related to substitution, which consequently become apparent.
      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 contractors request for manufacturer substitution.

2.2 COLD APPLIED 2-PLY THERMOPLASTIC HYBRID ROOF SYSTEM - KEE-Stone FB 60

A. Nailable Base Sheet: One ply fastened to the deck per wind uplift calculations.
   1. VersiPly 40:

B. Base (Ply) Sheet: One ply bonded to the prepared substrate:
   1. HPR Torch Base:

C. Thermoplastic Cap (Ply) Sheet: One ply bonded to the prepared substrate with Interply Adhesive (2):
   1. KEE-Stone FB 60:

D. Interply Adhesive: (1)
   1. torch sheets only.

E. Interply Adhesive: (2)
   1. KEE-Lock Foam

F. Flashing Base Ply: One ply bonded to the prepared substrate:
   1. HPR Torch Base:

G. Flashing Cap (Ply) Sheet: One ply bonded to the prepared substrate with Flashing Ply Adhesive:
   1. KEE-Stone FB 60 Flashing.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Inspect and approve the deck condition, slopes and fastener backing if applicable, parapet walls, expansion joints, roof drains, stack vents, vent outlets, nailers and surfaces and elements.

C. Verify that work penetrating the roof deck, or which may otherwise affect the roofing, has been properly completed.

D. If substrate preparation and other conditions are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. General: Clean surfaces thoroughly prior to installation.
   1. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
   2. Fill substrate surface voids that are greater than 1/4 inch wide with an acceptable fill material.
   3. Roof surface to receive roofing system shall be smooth, clean, free from loose gravel, dirt and debris, dry and structurally sound.
   4. Wherever necessary, all surfaces to receive roofing materials shall be power broom and vacuumed to remove debris and loose matter prior to starting work.
   5. Do not apply roofing during inclement weather. Do not apply roofing membrane to damp, frozen, dirty, or dusty surfaces.
   6. Fasteners and plates for fastening components mechanically to the substrate shall provide a minimum pull-out capacity of 300 lbs. (136 k) per fastener. Base or ply sheets attached with cap nails require a minimum pullout capacity of 40 lb. per nail.
   7. Prime decks where required, in accordance with requirements and recommendations of the primer and deck manufacturer.

3.3 INSTALLATION - GENERAL

A. Install modified bitumen membranes and flashings in accordance with manufacturer's instructions and with the recommendations provided by the National Roofing Contractors Association's Roofing & Waterproofing Manual, the Asphalt Roofing Manufacturers Association, and applicable codes.

B. General: Avoid installation of modified bitumen membranes at temperatures lower than 40-45 degrees F. When work at such temperatures unavoidable use the following precautions:
   1. Take extra care during cold weather installation and when ambient temperatures are affected by wind or humidity, to ensure adequate bonding is achieved between the surfaces to be joined. Use extra care at material seam welds and where adhesion of the applied product to the appropriately prepared substrate as the substrate can be

affected by such temperature constraints as well.

2. Unrolling of cold materials, under low ambient conditions must be avoided to prevent the likelihood of unnecessary stress cracking. Rolls must be at least 40 degrees F at the time of application. If the membrane roll becomes stiff or difficult to install, it must be replaced with roll from a heated storage area.

C. Commence installation of the roofing system at the lowest point of the roof (or roof area), working up the slope toward the highest point. Lap sheets shingle fashion so as to constantly shed water

D. All slopes greater than 2:12 require back-nailing to prevent slippage of the ply sheets. Use ring or spiral-shank 1 inch cap nails, or screws and plates at a rate of 1 fastener per ply (including the membrane) at each insulation stop. Place insulation stops at 16 ft o.c. for slopes less than 3:12 and 4 feet o.c. for slopes greater than 3:12. On non-insulated systems, nail each ply directly into the deck at the rate specified above. When slope exceeds 2:12, install all plies parallel to the slope (strapping) to facilitate backnailing. Install 4 additional fasteners at the upper edge of the membrane when strapping the plies.

3.4 INSTALLATION ROOF SYSTEM

A. Base Ply: Install torch base sheet to a properly prepared substrate. Shingle in proper direction to shed water on each area of roofing.

1. Lay out the roll in the course to be followed and unroll 6 feet (1.8 m).
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 6 feet (1.8 m) and bond it in a similar fashion.
4. Repeat this operation with subsequent rolls with side laps of 4 inches (101 mm) and end laps of 8 inches (203 mm).
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 2 inches (50 mm) beyond top edges of cants at wall and projection bases.
7. Install base flashing ply to all perimeter and projections details.

B. Thermoplastic Cap Ply: Allow plies to relax before installing. Install in interplay adhesive applied at the rate required by the manufacturer. Shingle sheets uniformly over the prepared substrate to achieve the number of plies specified. Shingle in proper direction to shed water on each large area of roofing.

1. All field seams exceeding 10 feet in length shall be welded with an approved automatic welder.
2. All field seams must be clean and dry prior to initiating any field welding. Remove foreign materials from the seams (dirt, oils, etc.) with acetone or authorized alternative. Use CLEAN WHITE COTTON cloths and allow approximately five minutes for solvents to dissipate before initiating the automatic welder. Do not use denim or synthetic rags for cleaning.
3. Contaminated areas within a membrane seam will inhibit proper welding and will require a membrane patch or strip.
4. All welding shall be performed only by qualified personnel to ensure the quality and continuity of the weld. The lap or seam area of the membrane may be intermittently tack welded to hold the membrane in place.
5. The back interior edge of the membrane shall be welded first, with a thin, continuous weld to concentrate heat along the exterior edge of the lap during the final welding pass.
6. Follow local code requirements for electric supply, grounding and surge protection.

The use of a dedicated, portable generator is highly recommended to ensure a consistent electrical supply, without fluctuations that can interfere with weld consistency.

7. Properly welded seams shall utilize a 1.5 inch wide nozzle, to create a homogeneous weld, a minimum of 1.5 inches in width.

C. Fibrous Cant Strips: Provide non-combustible perlite or glass fiber cant strips at all wall/curb detail treatments where angle changes are greater than 45 degrees. Cant may be set in approved cold adhesives, hot asphalt or mechanically attached with approved plates and fasteners.

D. Wood Blocking, Nailers and Cant Strips: Provide wood blocking, nailers and cant strips as specified in Section 06114.
   1. Provide nailers at all roof perimeters and penetrations for fastening membrane flashings and sheet metal components.
   2. Wood nailers should match the height of any insulation, providing a smooth and even transition between flashing and insulation areas.
   3. Nailer lengths should be spaced with a minimum 1/8 inch gap for expansion and contraction between each length or change of direction.
   4. Nailers and flashings should be fastened in accordance with Factory Mutual "Loss Prevention Data Sheet 1- 49, Perimeter Flashing" and be designed to be capable of resisting a minimum force of 200 lbs/lineal foot in any direction.

E. Metal Work: Provide metal flashings, counter flashings, parapet coping caps and thru-wall flashings in accordance with the SMACNA "Architectural Sheet Metal Manual" or the NRCA Roofing Waterproofing manual.

F. Termination Bar: Provide a metal termination bar or approved top edge securement at the terminus of all flashing sheets at walls and curbs. Fasten the bar a minimum of 8 inches (203 mm) o/c to achieve constant compression. Provide suitable, sealant at the top edge if required.

G. Flashing Base Ply: Install flashing sheets by the same application method used for the base ply.
   1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
   2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
   3. Adhere to the underlying base ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
   4. Solidly adhere the entire flashing ply to the substrate. Secure the tops of all flashings that are not run up and over curb through termination bar fastened at 6 inches (152 mm) O.C. and sealed at top.
   5. Seal all vertical laps of flashing ply with a three-course application of trowel-grade mastic and fiberglass mesh.
   6. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.
   7. Coordinate roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices with the roofing system work.
   8. Secure the top edge of the flashing sheet using a termination bar only when the wall surface above is waterproofed, or nailed 4 inches on center and covered with an acceptable counter flashing.

H. Flashing Cap Ply:

1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
3. Adhere to the underlying base flashing ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
4. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.
5. Coordinate roof accessories, miscellaneous sheet metal accessory items with the roofing system work.
6. All stripping shall be installed prior to flashing cap sheet installation.
7. Heat and scrape granules when welding or adhering at cut areas and seams to granular surfaces at all flashings.
8. Secure the top edge of the flashing sheet using a termination bar only when the wall surface above is waterproofed, or nailed 4 inches on center and covered with an acceptable counter flashing.

I. Roof Walkways: Provide walkways in areas indicated on the Drawings.

3.5 CLEANING

A. Clean-up and remove daily from the site all wrappings, empty containers, paper, loose particles and other debris resulting from these operations.

B. Remove asphalt markings from finished surfaces.

C. Repair or replace defaced or disfigured finishes caused by Work of this section.

3.6 PROTECTION

A. Provide traffic ways, erect barriers, fences, guards, rails, enclosures, chutes and the like to protect personnel, roofs and structures, vehicles and utilities.

B. Protect exposed surfaces of finished walls with tarps to prevent damage.

C. Plywood for traffic ways required for material movement over existing roofs shall be not less than 5/8 inch (16 mm) thick.

D. In addition to the plywood listed above, an underlayment of minimum 1/2 inch (13 mm) recover board is required on new roofing.

E. Special permission shall be obtained from the Manufacturer before any traffic shall be permitted over new roofing.

3.7 FIELD QUALITY CONTROL

A. Inspection: Provide manufacturer's field observations 3 days per week. Provide a final inspection upon completion of the Work.
1. Warranty shall be issued upon manufacturer's acceptance of the installation.
2. Field observations shall be performed by a Sales Representative employed full-time by the manufacturer and whose primary job description is to assist, inspect and approve membrane installations for the manufacturer.
3. Provide observation reports from the Sales Representative indicating procedures followed, weather conditions and any discrepancies found during inspection.
4. Provide a final report from the Sales Representative, certifying that the roofing system

has been satisfactorily installed according to the project specifications, approved details and good general roofing practice.

3.8 SCHEDULES

A. Base (Ply) Sheet:
1. HPR Torch Base: 110 mil SBS (Styrene-Butadiene-Styrene) rubber modified roofing base sheet reinforced with a fiberglass scrim. Designed for torch applications with a burn-off backer that indicates when the material is hot enough to be installed.
a. Tensile Strength, ASTM D 5147
1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 210 lbf/in XD 210 lbf/in
2) 50 mm/min. @ 23 +/- 2 deg. C MD 36.75 kN/m XD 36.75 kN/m
b. Tear Strength, ASTM D 5147
1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 300 lbf XD 300 lbf
2) 50 mm/min. @ 23 +/- 2 deg. C MD 1,334 N XD 1,334 N
c. Elongation at Maximum Tensile, ASTM D 5147
1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 6% XD 6%
2) 50 mm/min. @ 23 +/- 2 deg. C MD 6% XD 6%
d. Low Temperature Flexibility, ASTM D5147, Passes -30 deg. F (-34.4 deg. C)

B. Thermoplastic/Modified Cap (Ply) Sheet:
1. KEE-Stone FB 60: 60 mil thermoplastic, ketone ethylene ester (KEE) roofing membrane with polyester scrim. ASTM D6754
a. Breaking Strength, ASTM D 751, Proc. B, strip
1) 375 lbf. (1,668 N)
b. Tear Strength ASTM D 751
1) 120 lbf. min. (534 N)
c. Elongation at Break (%), ASTM D 751, Proc. B, Strip
1) 40.0%

C. Interply Adhesive:
1. KEE-Lock Foam: Dual component, single bead (ribbon applied) urethane insulation/membrane adhesive.
a. Tensile Strength (ASTM D 412) 250 psi
b. Density (ASTM D 1875) 8.5 lbs./gal.
c. Viscosity (ASTM D 2556) 22,000 - 60,000 cP
d. Peel Strength (ASTM D 903) 17 lb./in.
e. Flexibility (ASTM D 816) Pass @ -70deg. F (-56.7deg. C)

D. Surfacing:
1. Flashing Cap (Ply) Sheet:
a. KEE-Stone FB 60 Flashing: 60 mil thermoplastic, ketone ethylene ester (KEE) roofing membrane with polyester scrim. ASTM D 6754.
1) Breaking Strength, ASTM D 751, Proc. B, strip
a) 378 lbf
2) Tear Strength ASTM D 751
a) 120 lbf. minumum.
3) Elongation at Break (%), ASTM D 751, Proc. B, Strip
a) 40.0%

END OF SECTION

SECTION 07563
FLUID APPLIED ROOFING RESTORATION

PART 1 GENERAL

1.1 GENERAL INFORMATION

A. Provide all labor, equipment, and materials to install roof restoration products over the properly prepared existing roof substrate

1.2 SCOPE OF WORK

A. Pressure wash roofing membrane, allow to dry. Properly dispose of all debris.

B. Reinforce all seams and details with 6” wide UniBond ST tape

C. Install white silicone restoration coating – Cool-Sil SG - at 2.5 gallons per 100 square ft. over the entire roof field surface (including penetrations). Allow to dry.

D. Apply at 1.0 gallons per 100 square feet of Cool Sil SG over the entire roof surface, immediately broadcast 30lbs per square of T24 minerals into wet coating while wet and immediately back roll to set. After curing, clean up all loose minerals and dispose of.

1.3 SUBMITTALS

A. Product Data: Provide manufacturer's technical product data for each type of roofing product specified. Include data substantiating that materials comply with specified requirements.

B. Documentation of Existing Conditions: Document existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, condition of conduits, any existing damage to equipment on roof, etc that might be misconstrued as having been damaged by roofing operations. Submit before work begins. Use digital photographs and video.

C. Provide a copy of the 10 year warranty.

D. Provide a letter from the coating manufacturer stating that they will provide a full time employee of their company to inspect the roof during the project a minimum of 3 days per week at no additional cost to the contractor or the Water District and that if more inspections are requested or required that they will also be provided at no additional charges.

E. Provide a letter from the manufacturer stating that roofing contractor is certified to install this system and will be eligible for the warranty at the close of the project.

F. Provide a detailed schedule showing when each building area will be started and completed.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual.

B. Manufacturer Qualifications: Manufacturer: Company specializing in manufacturing products specified in this section with documented ISO 9001 certification and minimum twelve years and experience.

C. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress.

D. Product Certification: Provide manufacturer's certification that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.

E. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer. Upon request of the Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer

F. Installer must protect their equipment, trucks, ladder access, and any of their storage areas from access from public on site for various reasons.

G. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work and at any time roofing work is in progress. Maintain proper supervision of workmen. Maintain a copy of the specifications in the possession of the Supervisor/Foremen and on the Site at all times

1.5 PRE-INSTALLATION CONFERENCE

A. Convene a pre-roofing conference approximately two weeks before scheduled commencement of roofing system installation and associated work.

B. Require attendance of installers of deck or substrate construction to receive roofing, installers of rooftop units and other work in and around roofing which must precede or follow roofing work including Owner and roofing system manufacturer's representative.

C. Objectives include:
1. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.
2. Tour representative areas of roofing substrates, inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work.
3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
4. Review roofing system requirements, Drawings, Specifications and other Contract Documents.
5. Review and finalize schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
6. Review required inspection, testing, certifying procedures.
7. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing.
8. Record conference including decisions and agreements reached. Furnish a copy of records to each party attending.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging with labels intact until ready for installation.

B. Store all roofing materials in a dry place, on pallets or raised platforms, out of direct exposure to the elements until time of application. Store materials at least 4 inches above ground level and covered with "breathable" tarpaulins.

C. Stored in accordance with the instructions of the manufacturer prior to their application or installation. Store roll goods on end on a clean flat surface. No wet or damaged materials will

be used in the application.

D. Avoid stockpiling of materials on roofs without first obtaining acceptance from the manufacturer’s representative.

E. Storage temperatures should be between 60°F to 80°F (15.6° to 26.7°C) and not exceed 110°F (43.3°C). Indoor ventilated storage or use of temp-controlled containers is required. Ensure jobsite storage is in a shaded and ventilated area. Do not store in direct sunlight. Keep materials away from open flame or welding sparks. Contractor is responsible for any charges (including freight and tax) to replace any material that is damaged due to improper storing conditions.

F. Contractor is responsible for safe storage of materials. This includes environmental conditions and security conditions such as theft and vandalism.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Weather Condition Limitations: Do not apply roofing system during inclement weather or when precipitation is expected.

C. 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.

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

E. When applying materials with spray equipment, take precautions to prevent over spray and/or solvents from damaging or defacing surrounding walls, building surfaces, vehicles or other property. Care should be taken to do the following:
   1. Close air intakes into the building.
   2. Have a dry chemical fire extinguisher available at the jobsite.
   3. Post and enforce "No Smoking" signs.

F. Avoid inhaling spray mist; take precautions to ensure adequate ventilation.

G. Protect completed roof sections from foot traffic for a period of at least 48 hours at 75 degrees F (24 degrees C) and 50 percent relative humidity or until fully cured.

H. Take precautions to ensure that materials do not freeze.

I. Minimum temperature for application is 50 degrees F (10 degrees C) and rising

1.8 WARRANTY

A. Upon completion of the work, provide the Manufacturer's written and signed limited labor and materials Warranty, warranting that, if a leak develops in the roof during the term of this warranty, due either to defective material or defective workmanship by the installing contractor, the manufacturer shall provide the Owner, at the Manufacturer's expense, with the labor and material necessary to return the defective area to a watertight condition.
   1. Warranty Period:
      a. Ten (10) years

A. Installer is to guarantee all work against defects in materials and workmanship for a period indicated following final acceptance of the Work.
   1. Warranty Period:
      a. 5 years from date of acceptance.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Garland Company or District pre-approved equal. Local contact: Steve Lampman 949-322-1770

2.2 ROOF RESTORATION SYSTEM FOR MINERAL MODIFIED SURFACE ROOFS

A. Cool-Sil HB System:
   1. Coating: Cool-Sil SG (White)
   2. Repairs: Cool-Sil FG (White)
      Repairs and reinforcement: Uni-Bond ST 6”

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify that work penetrating the roof deck, or which may otherwise affect the roofing, has been properly completed.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 ROOF PREPARATION AND REPAIR

A. General: All necessary field and flashing repairs must be done according to good construction practices.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Repair all defects such as deteriorated roof decks; replace saturated insulation board, replace loose or brittle membrane or membrane flashings. Verify that exiting conditions meet the following requirements:
   1. Existing membrane is either fully adhered or that the membranes mechanical fasteners are secured and functional.

D. Remove all loose dirt and foreign debris from the roof surface. Do not damage roof membrane in cleaning process.

E. Clean and seal and repair any damaged metal where necessary. Seal watertight all fasteners, pipes, drains, vents, joints and penetrations where water could enter the building envelope.

F. Confirm local water run-off ordinances and restrictions prior to cleaning roof. Clean the entire roof surface by removing all dirt, algae, mold, moss, paint, oil, talc, rust or other foreign substance. Use a bio-degradable cleaner like Simple Green Oxy Solve when necessary and warm water. Scrub heavily soiled areas with a brush. Power wash roof thoroughly with an industrial surface cleaner equipped with one piece balanced spray rotating jets for streak

free close contact cleaning. Rinse with fresh water to completely remove all residuals. Allow roof to dry thoroughly before continuing.

G. Repair existing roof membrane as necessary to provide a sound substrate for the fluid-applied membrane. All surface defects (cracks, blisters, tears) must be repaired using Cool Sil HB and polyester in a three course manner, 2.5 gallons per coat.

3.3 INSTALLATION

A. General Installation Requirements:
   1. Install in accordance with manufacturer's instructions. Apply to minimum coating thickness required by the manufacturer.
   2. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing the roof system.
   3. Insurance/Code Compliance: Where required by code, install and test the roofing system to comply with governing regulation and specified insurance requirements.
   4. Protect work from spillage of roofing materials and prevent materials from entering or clogging drains and conductors. Replace or restore work damaged by installation of the roofing system.
   5. All primers must be top coated within 24 hours of application. Re-prime if more time passes after priming.
   6. Keep roofing materials dry during application.
   7. Coordinate counter flashing, cap flashings, expansion joints and similar work with work specified in other Sections under Related Work.
   8. Coordinate roof accessories and miscellaneous sheet metal accessory items, including piping vents and other devices with work specified in other Sections under Related Work.

B. Mineral Modified Roof Restoration: Renovation work includes:
   1. Surface preparation: Remove dirt, and debris.
      a. Previously coated roofs with well-adhered polyurethane or polyurea coating surfacing must be solvent-wiped with acetone after cleaning to reactivate surface for overcoating.
   2. Partially Reinforced System:
      a. Application of tape reinforcement (UniBond ST)
         1) Always begin with flashing laps and details.
         2) Remove the clear release liner from the back in workable sections
         3) Center 6 inch wide UniBond ST over the middle of the lap.
         4) Use care to install the tape uniformly. Do not stretch or cause air pockets, wrinkles or fishmouths.
         5) Apply pressure to tape starting at the center and work toward outside edge with a steel roller to activate the bonding process.
         6) Inspect the tape to ensure that it is properly installed. Verify edges are tightly fixed to surface. If any discrepancies are present, repair before the coating is applied.
         7) Saturate the tape with coating.
   3. Apply at 2.5 gallons per 100 SF of Cool Sil HB over the entire roof surface, back roll, let dry
   4. Apply at 1.0 gallons per 100 SF oof Cool Sil HB over the entire roof surface, immediately broadcast 30lbs per square of T24 minerals into wet coating while wet and immediately back roll to set.
   5. Liquid Flashings:
      a. All flashings are coated in the same manner as the field prior to field application.
      b. Vertical liquid flashings shall run a minimum of 4” onto the horizontal surface

3.4 CLEANING

A. Clean-up and remove daily from the site all wrappings, empty containers, paper, loose particles and other debris resulting from these operations.

B. Remove asphalt markings from finished surfaces.

C. Repair or replace defaced or disfigured finishes caused by Work of this section.

3.5 PROTECTION

A. As needed, provide traffic ways, erect barriers, fences, guards, rails, enclosures, chutes and the like to protect personnel, roofs and structures, vehicles and utilities.

B. Protect exposed surfaces of finished walls with tarps to prevent damage.

3.6 FIELD QUALITY CONTROL

A. Require attendance of roofing materials manufacturers' representatives at site during installation of the roofing system at a minimum of 3 days per week.

B. Correct defects or irregularities discovered during field inspection.

3.7 FINAL INSPECTION

A. At completion of roofing installation and associated work, meet with Owner, installer, roofing system manufacturer's representative and others directly concerned with performance of roofing system.

B. Walk roof surface areas, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. Identify all items requiring correction or completion and furnish copy of list to each party in attendance.

C. Repair or replace deteriorated or defective work found at time above inspection as required to a produce an installation that is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

D. Advise Owner upon completion of corrections.

E. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.

3.8 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.9 SCHEDULES

A. Reinforcement:
   1. UniBond ST: Fatigue resistant, polyester-faced adhesive tape.
      a. Tensile Strength 4500 psi.
      b. Elongation, 500%
      c. Low Temperature Flexibility, -70 degrees F (-56.6 degrees C).
      d. Service Temperature, -30 to 200 degrees F (-34.4 to 93.3 degrees C).
      e. Permeance ASTM 96b, .001 perms.
      f. Adhesion Greater than 20 ibs./in.

B. Coatings:
   1. Coating: Cool-Sil White Silicone Coating Highly reflective, multi- purpose, single-component 100% silicone, liquid waterproofing membrane.
      a. Tensile Strength: ASTM D 412, 350 psi
      b. Elongation: ASTM D 412, 174%
      c. Flash Point: ASTM D 93, 141 degrees F min. (60.6 degrees C)
      d. Solids Content: ASTM D 2369, Typical 95%
      e. VOC: <50 g/l
      f. Reflectance: 0.89
      g. Emittance: 0.90
      h. SRI: 113

C. Liquid Flashings
   1. Coating: Cool-Sil FG: Highly reflective multi- purpose, silicone, liquid sealer..
      a. Tensile Strength: ASTM D 412, 130 psi
      b. Elongation: ASTM D 412, 275%
      c. Solids Content: ASTM D 2369, Typical 95%
      d. VOC: <50 g/l

D. Sealant
   1. Sealant: All-Sil: Low modulus, high extension/compression and excellent adhesion to most building materials
      a. Tensile Strength: ASTM D 412, 130 psi
      b. Elongation: ASTM D 412, 275%
      c. Solids Content: ASTM D 2369, Typical 95%
      d. VOC: <50 g/l

END OF SECTION