INVITATION TO BID

2024 ROOFING PROJECTS

Charlotte Public Schools

Note: Charlotte Public schools will be soliciting bids for roofing projects throughout the district to be completed before July 1st, 2024. Project plans and details will be provided at the mandatory Pre- Bid meeting scheduled for Monday, January 15th, @ 9am. The pre-bid meeting will start at the High School (Board of Education and Central Administrative Offices) and move to the service building and Galewood Elementary School.

Mandatory Site Meeting:	**January 15th, 2024 @ 9am** Charlotte High School 378 State St. Charlotte, MI 48813
Contact:	Andrew Czaika (517) 541-5113
Bids Due:	**January 29th, 2024 @ 1pm** Administration Building 378 State St. Charlotte, MI 48813

Bids will be accepted by:

Michelle Sine, Associate Superintendent
Charlotte Public Schools
378 State St.
Charlotte, MI 48813

SECTION 00 41 00

PROPOSAL FORM

1.1 PROPOSAL DUE

A. January 29th, 2024 @ 1. P.M. Local Time.

1.2 PROPOSAL

A. The GENERAL CONTRACTOR PROPOSAL shall include and cover ALL CONSTRUCTION TRADES, including but not limited to roofing contractor trades, as well as being responsible for all coordination between trades.

B. COMPANY _____

1. Please indicate Company name above.

C. TO: Comstock Public Schools Administration Offices, 3010 Gull Road, Kalamazoo, MI 49048

D. ATTN: Mr. Sean Gillette

E. The undersigned represents that they have:

1. Familiarized themselves with the local conditions affecting the cost of the work and with the Contract Documents, including Instructions to Bidders; Proposal Section; General, Supplementary and Special Conditions; etc., Drawings, Specifications and any Addenda issued and on file at the office of GMB Architecture + Engineering, 85 East Eighth Street, Suite 200, Holland, Michigan, and hereby proposes to perform everything required to provide and furnish all labor, materials, necessary tools, expendable equipment, and all utility and transportation services, etc., necessary to perform and complete in a workmanlike manner all of the Work required for the construction of "Comstock High School Reroofing" in accordance with the Contract Documents as prepared by GMB Architecture + Engineering, Holland, Michigan, including Addenda No. __, ___, ___.
2. Included with this proposal a Bid Bond, Certified or Cashier's Check in the amount of five (5) percent or_____dollars ($_____).
3. Reviewed the Work fully understands the scope of the work required by interfacing Sub-Contractors as well as that required by the General Contractor, all of which is covered in this Proposal.
4. Agreed that their proposal, if accepted by the Owner, will be the basis for a contract directly with the Owner and to enter into such contract in accordance with the Intent of the Contract Documents.

1.3 BASE BID – HIGH SCHOOL

A. The work described and specified shall be performed for the following Lump Sum, such amount constituting the Base Bid:

1. _____dollars ($_____) (amount of bid)

1.4 BASE BID – GALEWOOD

A. The work described and specified shall be performed for the following Lump Sum, such amount constituting the Base Bid:

1. _____dollars ($_____) (amount of bid)

1.5 PLM BOND

A. The cost for the Performance Bond and Labor and Material Payment Bond for the Base Bid Work shall be included in the base bid.

1.6 UNIT PRICES

A. Please provide unit prices for installing additional material after bids have been accepted. These unit prices should be utilized in quotations for any requested additional work or change orders.

1. Wet Insulation Removal & Replacement: $_____/SF
2. Drain Replacement: $_____/Unit
3. Deck Repair: $_____/SF
4. Nailer Remove & Replace: $_____/LNFT

1.7 CHANGE ORDER MARK-UP

A. The General Contractor will supervise all sub-contractor Change Orders for a fee of 10% of cost change, which shall include all supervision, labor, general conditions and overhead and fee.

1.8 AGREEMENT

A. In submitting this bid, it is understood that the right is reserved by the Owner to reject any or all bids. It is agreed that this bid is binding for a period of sixty (60) days from the opening thereof.

1. Date _____
2. COMPANY NAME _____
3. ADDRESS _____
4. PHONE _____
5. (Signature) (Type or Print)_____
6. TITLE _____

AFFIDAVIT OF BIDDER

The undersigned, the owner or authorized officer of _____(the "Bidder"), pursuant to the familial disclosure requirement provided in the _____(the "School District") advertisement for construction bids, hereby represent and warrant, except as provided below, that no familial relationships exist between the owner(s) or any employee of _____ and any member of the Board of Education of the School District or the Superintendent of the School District.

List any Familial Relationships:

BIDDER:

_____

By: _____

Its: _____

STATE OF MICHIGAN)

) ss.

COUNTY OF _____)

This instrument was acknowledged before me on the _____day of _____, _____ by _____.

_____

, Notary Public

_____County, Michigan

My Commission Expires: _____

Acting in the County of: _____

AFFIDAVIT OF COMPLIANCE – IRAN ECONOMIC SANCTIONS ACT

Michigan Public Act No. 517 of 2012

The undersigned, the owner or authorized officer of _____(**the "Bidder"**), pursuant to the compliance certification requirement provided in the _____ (**the "School District**") Request For Proposals For _____**(the project)** hereby certifies, represents and warrants that the Bidder (including its officers, directors and employees) is not an "Iran linked business" within the meaning of the Iran Economic Sanctions Act, Michigan Public Act No. 517 of 2012 (the "Act"), and that in the event Bidder is awarded a contract / purchase order as a result of the aforementioned Request For Proposal, the Bidder will not become an "Iran linked business" at any time during the course of performing the Work or any services under the contract.

The Bidder further acknowledges that any person who is found to have submitted a false certification is responsible for a civil penalty of not more than $250,000.00 or 2 times the amount of the contract/purchase order or proposed contract for which the false certification was made, whichever is greater, the cost of the School District's investigation, and reasonable attorney fees, in addition to the fine. Moreover, any person who submitted a false certification shall be ineligible to bid on a request for proposal for three (3) years from the date it is determined that the person has submitted the false certification.

BIDDER:

_____

By: _____

Its: _____

Date: _____

STATE OF _____)

)ss.

COUNTY OF _____)

This instrument was acknowledged before me on the _____day of _____, _____, by _____.

_____

, Notary Public

_____County, Michigan

My Commission Expires: _____

Acting in the County of: _____

END OF SECTION

TABLE OF CONTENTS
SPECIFICATIONS GROUP

CHARLOTTE PUBLIC SCHOOLS DISTRICT STANDARDS

SPECIFICATIONS GROUP
GENERAL REQUIREMENTS SUBGROUP

DIVISION 01 - GENERAL REQUIREMENTS		PAGES
01 11 00	Summary of Work – High School	3
01 11 00	Summary of Work – Galewood	2
01 32 17	Construction Schedule	3
01 33 00	Submittals and Substitutions	4
01 50 00	Construction Facilities and Temporary Controls	2
01 66 00	Storage and Protection	1
01 71 00	Cleaning	2
01 73 29	Cutting and Patching	2
01 77 00	Closeout Procedures	4

SPECIFICATION GROUP
FACILITY CONSTRUCTION SUBGROUP

DIVISION 02 - EXISTING CONDITIONS		
02 41 16	Demolition	5

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES		
06 10 00	Rough Carpentry	5

DIVISION 07 - THERMAL AND MOISTURE PROTECTION		
07 21 00	Building Insulation	3
07 52 00	Modified Bituminous Membrane Roofing	14
07 56 00	Fluid Applied Restoration	16
07 56 30	Fluid Applied Membrane Roofing	13
07 62 00	Sheet Metal Flashing and Trim	11
07 92 00	Joint Sealants	3

DIVISION 32 - EXTERIOR IMPROVEMENTS		
32 94 00	Turf and Grasses	5

SECTION 01 11 00

SUMMARY OF WORK

PART 1 -GENERAL

1.01 WORK REQUIRED BY CONTRACT DOCUMENTS

A. The work of this project consists of, but is not limited to the Scope of Work listed below. This scope is preliminary and for information purposes only. It is the responsibility of the contractor to perform all work as shown, specified and required based upon the contract documents (drawings, specifications, addenda, etc.)

B. Dome Roof Valley Section

1. Install a new 2-ply Hybrid Liquid Applied membrane roofing system on roof areas:

2. Roof deck repair, where needed, will be based on a unit cost.

3. All roof projections shall be raised a minimum of 8” above the projected new roof line. Additional wood blocking shall also be installed at the perimeter locations as necessary in order to provide proper height for the new metal edge system. Wood blocking shall be installed as needed according to Section 06 10 00 and shall be included in the contractor’s base bid.

4. Install 2 layers of polyisocyanurate insulation to the concrete deck in cold process insulation adhesive to achieve thickness of 5.2” per ASCE 7-10 wind uplift requirements. 1/4” tapered system of Polyisocyanurate insulation to be installed over 2-layers of base insulation.

5. Install a layer of 1/4” primed dens deck board in cold process insulation adhesive. Be sure to stagger all insulation joints so that at no point are 2 joints continuous. All roof drains shall receive new 8’ from center tapered drain sumps.

6. Install a new torch applied SBS modified bitumen base ply directly over recovery board. Install base sheet over entire roof area.

7. Install all new penetration, expansion joints and perimeter flashing per manufacturer’s warranty guidelines and NRCA requirements.

8. All rusted metal roof projections will be wire brushed, seams and fasteners caulked and painted with 2 coats of non-fibered aluminum coating.

9. Install polyurea base coat at 3 gal./ sq. and embed polyester scrim. Make sure scrim is completely embedded into base coat. Allow base coat to cure for 24 hours.

10. Apply polyurea top coat at a rate of 2 gal./sq. over base coat.

11. Install new 22-ga edge metal, counter-flashing, and accessory flashings per manufacturer’s warranty guidelines, SMACNA and NRCA requirements.

12. Clean up all debris and damage done to grounds, building and roof top (if any).

C. Dome Roof Steep Slope Section

1. Install partially reinforced Polyurea restoration coating:

2. Make any necessary repairs, including removal of any wet insulation and roofing materials and replace with like materials.

3. Repair any flashing or field deficiencies and replace crickets as identified in the drawings.

4. Allow repairs to cure completely.

5. Carefully power wash all roof surfaces with greater than 2,000 psi pressure to remove debris, rust, scale, dirt, dust, chalking, peeling or flaking coatings, etc. Do not force water into the roof system or damage roof surfaces.

6. Wearing personal protective clothing and equipment, treat areas of algae, mildew or fungus with a solution of three quarts of warm water and TSP or Simple Green Solution.

7. Rinse at least twice to be sure all cleaning agents or contaminants are completely removed to prevent adhesion issues.

8. If the roof surface becomes contaminated with dirt, dust or other particles at any time during the application of the LiquiTec system, cleaning measures must be taken to restore the surface to a suitable condition.

9. Install 6” Unibond self adhering reinforcement tape to all membrane seams.

10. Install LiquiTec Flashing Grade to the entire surface of the roof at a rate of 3 gal/sq.

11. Allow to cure thoroughly. (24 hours)

12. Apply a top coating of LiquiTec Flashing Grade in a uniform manner at minimum application rate of 2 gal./ 100 SF over the entire roof surface, including all flashings.

D. The work of this Contract shall be performed in Work Segments as indicated on Drawings coordinating will all workers involved in the performance of the Work required by every Work Segment and to ensure that all trades are fully aware of the Project Segment Requirements.

E. Work under this contract as described per these specifications.

1.02 LOCATION OF SITE

A. **Charlotte High School**

1.03 WORK UNDER OTHER CONTRACT

A. Separate contracts may be issued by the District. Reference General Conditions, Article 10 for further information.

1.04 WORK SEQUENCE AND LIQUIDATED DAMAGES

A. Reference:
1. Time for Completion and Liquidated Damages; General Conditions, Article 7.5.
2. Progress Schedule; General Conditions, Article 7.3.
3. Supplementary Conditions, Article 1.01, 1.02.

A. Time limit(s) for Completion of work:
1. General

a. The work shall commence as soon as weather conditions allow and must be completed by the end of June in the year 2024.
b. Liquidated damages will be assessed from the Contractor at a rate Five Hundred dollars, $500 per day.
c. Contractor shall anticipate and include in his bid costs, that construction operations will proceed during the construction time stated in the Contract Documents. If the Contractor chooses to schedule or to accomplish the work in less than the Contract Time, it shall be at his own option and risk; and shall be fully coordinated with the Project Manager, and all other Contractors; and shall not establish a cause for any claim for delay, extended overhead, damages, or additional compensation of any kind against the District, Architect, or Project Manager for any reason.
d. Asbestos and Lead Abatement will be performed as required. Reference Specification for Asbestos and Lead Abatement.

1.05 RELATED WORK BY DISTRICT AND CONTRACTOR RESPONSIBILTY

A. General: All such work indicated in the Contract Documents and/or specified herein.

B. Contractor responsibilities:
1. Inspect delivered products; report damaged or defective items.
2. Unload, handle at site, including uncrating and storage.
3. Providing sanitary facilities.
4. Providing storage container for materials to protect from exposure to elements or damage. Location to be determined.
5. Repair or replace items damaged as result of Contractor's operations.
6. Provide guarantees and warranties for both materials and labor.

1.08. WORK BY OTHERS

A. Separate Contract(s): Under separate contracts, construction of buildings and site improvements will be concurrently in progress on the site. All contractors shall cooperate and coordinate their sequence of work for proper interface and time completion of the work.

1.09. TIME OF WORK

A. Contractor is allowed to work from **7am to 7pm Sunday-Sunday.** Weekend work and holidays may be allowed by obtaining prior written approval from the Project Manager. Scope of work needs to be verified with the school as to limit disruption during school hours.

1.10. OCCUPANCY

A. Full Owner Occupancy: The Owner will occupy the site and existing buildings during the entire construction period. The Contractor shall coordinate and cooperate with the Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with the Owner's operations.

END OF SECTION

SECTION 01 11 01

SUMMARY OF WORK – GALEWOOD

PART 1 -GENERAL

1.01 WORK REQUIRED BY CONTRACT DOCUMENTS

A. The work of this project consists of, but is not limited to the Scope of Work listed below. This scope is preliminary and for information purposes only. It is the responsibility of the contractor to perform all work as shown, specified and required based upon the contract documents (drawings, specifications, addenda, etc.)

B. Modified 1-Ply Torch Applied System - Retrofit

1. Contractor to remove all gravel from the existing BUR via HydroVac system.
2. Remove existing wet insulation that was identified in the thermal imaging scan.
3. Any mechanical units or penetrations that are no longer in use shall be removed with openings infilled with metal plate, and roof built up to current height using polyisocyanurate insulation, recovery board, and cap sheet installed in cold asphalt.
4. Existing flashings shall be removed from parapet walls and vertical flashings.
5. Contractor should install a 1/2” primed dens deck directly to existing roof using approved foam adhesive.
6. New roofing system shall consist of HPR Torch Base Sheet and StressPly IV Mineral Torch Cap Sheet.
7. New flashing system shall consist of FlexBase Sheet and StressPly FR Mineral Cap Sheet.
8. Flashing system to be adhered using Flashing Bond at manufacturer’s recommended coverage rate.
9. All vertical flashings are to be 3-coursed using Silver-Flash Fibered Asphalt Mastic and Gar-Mesh Scrim.
10. All new terminations, counter-flashings, and gravel stops/ copings are to be installed in accordance with ANSI-SPRI ES1 with fabricated 22-gauge sheet metal in prefinished, stock color.
11. Drain covers shall be painted red.
12. The field and flashing shall be coated with Garla-Brite at .5 gal./ sq. (two coats) after manufactures representative has verified the proper curing of all asphaltic components.
13. Manufacturer’s representative must be present at least 3 days per week during the duration of the project and for all pre-determined milestones.
14. Manufacturer to provide a 30-year NDL warranty and the installing contractor is to provide a 2-year workmanship warranty.

1.02 LOCATION OF SITE

A. **Galewood Elementary School**

1.03 WORK UNDER OTHER CONTRACT

A. Separate contracts may be issued by the District. Reference General Conditions, Article 10 for further information.

1.04 WORK SEQUENCE AND LIQUIDATED DAMAGES

A. Reference:
1. Time for Completion and Liquidated Damages; General Conditions, Article 7.5.
2. Progress Schedule; General Conditions, Article 7.3.
3. Supplementary Conditions, Article 1.01, 1.02.

A. Time limit(s) for Completion of work:
1. General
a. The work shall commence as soon as weather conditions allow and must be completed by the end of June in the year 2024.
b. Liquidated damages will be assessed from the Contractor at a rate Five Hundred dollars, $500 per day.
c. Contractor shall anticipate and include in his bid costs, that construction operations will proceed during the construction time stated in the Contract Documents. If the Contractor chooses to schedule or to accomplish the work in less than the Contract Time, it shall be at his own option and risk; and shall be fully coordinated with the Project Manager, and all other Contractors; and shall not establish a cause for any claim for delay, extended overhead, damages, or additional compensation of any kind against the District, Architect, or Project Manager for any reason.
d. Asbestos and Lead Abatement will be performed as required. Reference Specification for Asbestos and Lead Abatement.

1.05 RELATED WORK BY DISTRICT AND CONTRACTOR RESPONSIBILTY

A. General: All such work indicated in the Contract Documents and/or specified herein.

B. Contractor responsibilities:
1. Inspect delivered products; report damaged or defective items.
2. Unload, handle at site, including uncrating and storage.
3. Providing sanitary facilities.
4. Providing storage container for materials to protect from exposure to elements or damage. Location to be determined.
5. Repair or replace items damaged as result of Contractor’s operations.
6. Provide guarantees and warranties for both materials and labor.

1.08. WORK BY OTHERS

A. Separate Contract(s): Under separate contracts, construction of buildings and site improvements will be concurrently in progress on the site. All contractors shall cooperate and coordinate their sequence of work for proper interface and time completion of the work.

1.09. TIME OF WORK

A. Contractor is allowed to work from **7am to 7pm Sunday-Sunday.** Weekend work and holidays may be allowed by obtaining prior written approval from the Project Manager. Scope of work needs to be verified with the school as to limit disruption during school hours.

1.10. OCCUPANCY

A. Full Owner Occupancy: The Owner will occupy the site and existing buildings during the entire construction period. The Contractor shall coordinate and cooperate with the Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with the Owner’s operations.

END OF SECTION

SECTION 01 32 17

CONSTRUCTION SCHEDULE

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work included: To assure adequate planning and execution of the work so that the work is completed within the number of calendar days allowed in the Contract, and to assist the Architect in appraising the reasonable ness of the proposed schedule and in evaluation progress of the work, prepare and maintain the schedules and reports described in this section. Refer also to the General Conditions, Article 3. In the event of conflict between this section and Article 3, GC, Article 3 shall govern.

B. Definition: “Day” used throughout the Contract, unless otherwise stated, means “consecutive calendar day”.

1.02 QUALITY ASSURANCE

A. Qualifications of scheduling personnel: Employ a scheduler who is thoroughly trained and experienced in compiling construction schedule data, in analyzing by use of “Cost-loaded Primavera Critical Path Method", and in preparation and issue of periodic reports as required below. Refer to Article 3 of Bid General Conditions.

1. Submit computer program schedule(s) as acceptable by the District.

B. Reliance upon approved schedule:

1. The construction schedule as approved by the District will be an integral part of the Contract and will establish interim Contract completion dates for the various activities.
2. Should any activity not be completed within 15 days after the stated scheduled date, the District shall have the right to order the Contractor to expedite completion of the activity by whatever means the District deems appropriate and necessary, without additional compensation to the Contractor.
3. Should any activity be 30 or more days behind schedule, the Architect or District shall have the right to perform the activity or have the activity performed by whatever method the Architect /District deems appropriate.
4. Costs incurred by the Architect/CM in connection with expediting construction activity under this Article shall be reimbursed to the District by the Contractor. The District shall, in turn, reimburse the Architect/CM.
5. It is expressly understood and agreed that failure by the Construction Manager or Architect to exercise the option to either order the Contractor to expedite an activity or to expedite the activity by other means shall, not be considered precedent-setting for any other activities.

1.3 SUBMITTALS

A. General: Comply with the provisions of Section 01 33 00.

B. Construction schedule: Within 10 days after receipt of Notice to Proceed, submit one reproducible and four prints of construction schedule prepared in accordance with PART 3 of this section and Article 3 of the Bid General Conditions.

C. Periodic reports: On the first working day of each month following submittal described in Paragraph 1.3 B above, submit four prints of the construction schedule updated as described in PART 3 of this section and Article 3 of the Bid General Conditions.

PART 2 – PRODUCTS

2.01 CONSTRUCTION ANALYSIS

A. Diagram: Graphically show the order and interdependence of all activities necessary to complete the work, and the sequence in which each activity is to be accomplished, as planned by the Contractor and his project field superintendent in coordination with all subcontractors whose work is shown on the diagram. Activities shown on the diagram shall include, but are not necessarily limited to:

1. Project mobilization.
2. Underground work and site preparation.
3. Major activities.
4. Critical material and equipment.
5. Critical Path including Float time, when applicable.
6. Delivery Dates.
7. Final cleanup.
8. Final inspection and testing.
9. Critical activities designated by the Architect and District that affect progress.

B. As a condition for submitting a bid for this project, the Contractor shall present a schedule using the entire time as referenced in the Special Conditions. In the event that the Contractor's analysis shows a completion date prior to the time allotted in the aforementioned Section (Schedule), the Contractor shall show the "float" time at the end of the schedule.

The District and the Contractor co-own the "float". Refer to Article 3 of the Bid General Conditions for more instruction on this critical point.

C. Data processing: Process the data by computer-aided methods (Cost-loaded Primavera per General Conditions, Article 3) to a degree of promptness and accuracy assuring complete display of all pertinent and current information at date of each periodic report.

D. Distribute an updated and revised schedule every 2 weeks or as requested by the Architect.

PART 3 – EXECUTION

3.01 CONSTRUCTION SCHEDULE

A. As soon as practicable after receipt of Notice to Proceed, complete, in preliminary form, the construction analysis described in Article 2.1 above. Meet with the Architect and District, review contents or proposed construction schedule, and make all revisions agreed upon. Submit in accordance with Paragraph 1.3 B above.

3.02 PERIODIC REPORTS

A. Construction Schedule: Contents:

1. Report actual progress by updating the schedule.
2. Note or clearly show on a revised issue of affected portions of the schedule all revisions causing changes.
3. Show activities or portions of activities completed during the reporting period.
4. It the work is behind schedule, also report progress along other paths with negative slack.
5. Include a narrative report that shows, but is not necessarily limited to

a. A description of the problem areas, current and anticipated.
b. Delaying factors and their impact.
c. An explanation of corrective actions taken or proposed.

B. Show the date of latest revision. Submit in accordance with the provisions of Paragraph 1.3B above.

C. Make only those revisions to approved construction schedule as are approved in advance by the Architect.

END OF SECTION

SECTION 01 33 00

SUBMITTALS AND SUBSTITUTIONS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Work included:

1. Wherever possible throughout the Contract Documents, the maximum acceptable quality of workmanship and materials has been defined by manufacturer's name and catalog number, reference to recognized industry and government standards, or description of required attributes and performance.
2. To ensure that the specified products are furnished and installed in accordance with design intent, procedures have been established for advance submittal of design data and for their review by the Architect.
3. Make all submittals required by the Contract Documents and revise and re-submit as necessary to establish compliance with the specified requirements.

B. Related work described elsewhere: Individual requirements for submittals are described in pertinent sections of these Specifications. Refer also to General Conditions, Article 11. Substitutions.

1.2 QUALITY ASSURANCE

A. Coordination of submittals: Prior to each submittal, carefully review and coordinate all aspects of each item being submitted and verify that each item and the submittal for it conforms in all respects with the requirements of the Contract Documents. By affixing the Contractor's signature to each submittal, certify that this coordination has been performed.

B. Certificates of compliance:

1. Certify that all materials used in the work comply with all specified provisions thereof. Certification shall not be construed as relieving the Contractor from furnishing satisfactory materials if, after tests are performed on selected samples, the material is found to not meet specified requirement.
2. Show on each certification the name and location of the Work, name and address of Contractor, quantity and date or dates of shipment or delivery to which the certificate applies, and name of the manufacturing or fabricating company. Certification shall be in the form of letter or company-standard forms containing all required data. Certificates shall be signed by an officer of the manufacturing or fabricating company.

3. In addition to the above information, all laboratory test reports submitted with certificates of compliance shall show the date or dates of testing, the specified requirements for which testing was performed, and results of the test or tests.

1.3 SUBMITTALS

A. Certificates of Compliance: Upon completion of the work, and as a condition of its acceptance, submit to the Architect all certificates of compliance.

B. Procedures: Make submittals in strict accordance with provisions of this section.

C. \Submittal Schedule: Pursuant to Article 3 of the General Conditions, provide a submittal schedule as outlined. Provide updated copies of the schedule, including status of all submittals, at the project meetings.

D. Provide digital copies of submittal.

PART 2 – PRODUCTS

2.1 SHOP DRAWINGS AND COORDINATION DRAWINGS

A. Shop drawings:

1. Scale and measurements: Make all shop drawings accurately to a scale sufficiently large to show all pertinent aspects of the item and its method of connection to the work. Specifically call to the Architect's attention any deviation from the Contract requirements.
2. Copying of the Contract Documents for purposes of revisions or as base sheets for the required submittal is expressly prohibited.
3. Quantities and type of prints required: Submit all shop drawings in the form of one sepia transparency of each sheet plus 3 blue-line or black-line prints of each sheet. Blueprints will not be acceptable. Additionally on a digital DVD containing PDF files.
4. Reproduction of review shop drawings: Printing and distribution of review shop drawings for the Architect's use will be by the Architect. All review comments of the Architect will be shown on the sepia transparency when it is returned to the Contractor. The Contractor shall make and distribute a minimum of six (6) copies as directed by the Architect.

5. Provide digital copies of shop drawings.

2.2 MANUFACTURERS' LITERATURE

A. General: Where contents of submitted literature from manufacturers includes data not pertinent to the submittal, clearly indicate which portion of the contents is being submitted for review.

B. Number of copies required: Submit the number of copies required to be returned plus four (4) copies that will be distributed by the Architect.

2.3 SAMPLES

A. Accuracy of samples: Samples shall be of the precise article proposed to be furnished.

B. Number of samples required: Unless otherwise specified, submit all samples in the quantity that is required to be returned plus 2 that will be retained by the Architect.

C. Samples are not required for materials that match those called out by name in the specifications.

2.4 COLORS AND PATTERNS

A. Unless the precise color and pattern is specifically described in the Contract Documents, and whenever a choice of color or pattern is available in a specified product, submit accurate color and pattern charts to the Architect for review and selection.

2.5 SUBSTITUTIONS

A. Approval required:

1. The Contract is based on the standards of quality established in the Contract Documents. All substitutions of the specified product(s) shall be submitted 10 days prior to the opening of the bid.

PART 3 – EXECUTION

3.1 IDENTIFICATION OF SUBMITTALS

A. General:

1. Forward all submittals to the office of the Project Manager.
2. All shipping charges shall be prepaid.
3. Consecutively number all submittals.
4. Accompany each submittal with a letter of transmittal containing all pertinent information required for identification and checking of submittals, including the following:

    a. Project name and location.
    b. Architect's job number.
    c. Subcontractor's, vendor's and/or manufacturer's name and address.
    d. Product identification.
    e. Drawing title, number, and date: and revision number and date, if applicable.
    f. Applicable Contract Drawings' sheet and detail numbers, along with Specifications' section number and specific paragraphs.
    g. Numbers of applicable reference standards specified (ASTM, FS, etc.) and all other additional data as may be required by the Specifications.
    h. State any deviation from Contract documents and Justification therefore.

B. Internal identification: On at least the first page of each copy of each submittal, and elsewhere as required for positive identification, clearly indicate the submittal number in which the item was included.

C. Re-submittals: When material is re-submitted for any reason, transmit under a new letter of transmittal and with a new submittal number and reference to original submittal number.

D. Submittal log: Maintain an accurate submittal log for the duration of the Contract, showing current status of all submittals at all times. Make the submittal log available for the Architect's review upon request and distribute copies monthly to Architect and District.

3.2 COORDINATION OF SUBMITTALS

A. General: Prior to submittal for approval, use all means necessary to fully coordinate all materials including, but not necessarily limited to:

1. Determining and verifying all interface conditions, catalog numbers, and similar data.
2. Coordination with other trades as required.
3. Clearly indicating all deviations from requirements of the Contract Documents.

B. Group of submittals: Unless otherwise specified, make all submittals in groups containing all associated items to ensure that information is available for checking each item when it is received. Partial submittals may be rejected as not complying with the provisions of the Contract Documents and the Contractor shall be strictly liable for all delays so occasioned.

3.3 TIMING OF SUBMITTALS

A. General: Within 35 days after Contract award, Contractor shall submit for Architect's written approval a list of all items he and his subcontractors propose to use in the work; also the particular brand of any article where more than one is specified as a standard. Make all submittals far enough in advance of scheduled dates for installation to provide all time required for reviews, for securing necessary approvals form the Division of the State Architect, including the Department of Fire and Life Safety (formerly referred to as the State Fire Marshall), for possible revisions and re-submittals, and for placing orders and securing delivery.

B. Review time: In scheduling, allow at least 14 calendar days for review by the District following receipt of the submittal.

C. Delays: Delays caused by tardiness in receipt of submittals will not be an acceptable basis for extension of the Contract completion date.

3.4 ARCHITECT'S REVIEW

A. General: Review by the Architect shall not be construed as a complete check, but only that the general method of construction and detailing is satisfactory. Review shall not relieve the Contractor from responsibility for errors that may exist.

B. Authority to proceed: The notations “reviewed”, or “Furnish As Corrected” authorize the Contractor to proceed with fabrication, purchase, or both, of the items so noted, subject to the revisions, if any, required by the Architect’s review comments.

C. Revisions: Make all revisions required by the Architect. If the Contractor considers any required revision to be a change, he shall so notify the Architect as proved for under “Changes and Extra Work” in the General Conditions, Show each drawings revision by number, date, and subject in a revision block on the drawing. Make only those revisions directed or approved by the Architect.

3.5 APPROVED SUBMITTALS

A. Materials, fabricated articles and other items to be installed in permanent work shall be those of approved submittals only and shall not be fabricated, delivered or incorporated in the work until submittals are approved as provided herein.

B. Approval or acceptance of items will not preclude rejection of any item upon discovery of defects in them prior to final acceptance of completed work.

C. After an item has been approved, no charge in brand or make will be permitted unless:

1. Satisfactory written evidence is presented to and approved by the Architect that manufacturer cannot make scheduled delivery of approved item; or
2. The item delivered has been rejected and substitution of a suitable item is an urgent necessity; or other conditions become apparent that indicate approval of such substitute item to be best interest of District.

3.6 CALCULATIONS OR TEST DATA

A. The manufacturer or supplier of certain products will be required to submit substantiating data to show compliance with structural requirements (including seismic) for items in this Specification.

B. All calculations shall be prepared by a structural engineer licensed in California, and all test data shall be by an independent testing lab.

C. Submittals shall be made to Architect, who will review and comment and forward to the Division of the State Architect for final approval.

END OF SECTION

SECTION 01 50 00

CONSTRUCTION FACILITIES & TEMPORARY CONTROLS

1.1 REFERENCE

A. Requirements in Addenda, Alternates, Conditions, and Division 1 collectively apply to this work.

B. Refer to SUPPLEMENTARY GENERAL AND SPECIAL CONDITIONS for additional information relative to this Section.

1.2 SITE RESTRICTIONS

A. General: Contractor is advised that the school site will be occupied and that school will remain in session during the term of the contract. Site access is limited. Contractor shall coordinate new work, access, and any site restrictions with District. No workers will be allowed on school site outside work areas and construction barricades, unless specifically authorized and having proper CDOJ clearance.

B. Vehicular Access: When school is in session, vehicular access/movement is not permitted within 30 minutes before school, nor during school lunch hours, recesses or breaks between class periods, nor within 30 minutes after end of school. Contractor to coordinate exact times with Construction Manager or School Principal and schedule his work accordingly. Extra care must be taken by Contractor to insure safety of all students and staff.

C. Noise: When school is in session, jackhammering, demolition, and equivalent noise disruption shall be scheduled to create least disturbance to school. Contractor shall coordinate these activities with school staff and provide notice prior to commencing operations that will create excessive noise. Do NOT jackhammer or create similar noise disruption on “school days” during “normal school hours” unless approved in writing by Construction Manager or School Principal.

1.3 PARKING OF VEHICLES

A. Contractor shall assume all responsibility for job site vehicle parking of his and his subcontractor's vehicles. Parking is limited and shall be approved by the District and the Construction Manager.

B. Contractor shall assume all responsibility for job site vehicle parking of his and his subcontractor's vehicles. Locations of parking shall be as directed by District. On-site parking is limited and shall be only where allowed by District.

1.4 STORAGE AND LAYDOWN AREAS

A. District and Construction Manager will coordinate use of available laydown areas for Contractor(s). Areas other than those designated by District are NOT to be used by Contractor(s).

B. Turf/Landscaped areas, which are to remain turf/landscaped areas, shall NOT be used for storage or laydown areas.

1.5 SAFETY AND SECURITY

A. Contractor shall provide and maintain at its sole expense, necessary temporary safety barriers surrounding work areas in accordance to California Industrial Safety Code requirements, or as required by School District where District Inspector deems a hazard exists. Contractor is responsible for security of all equipment, material, and completed construction items.

1.6 TEMPORARY CONSTRUCTION, EQUIPMENT AND PROTECTION.

A. Safety: Contractor is responsible for complete safety of site personnel, District personnel, students, and general public at all times in regards to work of this Contract.

B. Access: Contractor shall maintain access to existing buildings and athletic facilities at all times when specifically requested by District. Temporary walkways and/or barricades may be required.

C. Protection: Contractor must protect all workers and equipment from power lines and maintain safe distances and protective devices as required by Industrial Safety Commission and CAL-OSHA.

D. Temporary Construction and Equipment: All temporary construction and equipment shall conform to all regulations, ordinances, laws and other requirements of State and other authorities having jurisdiction, including insurance companies, with regards to safety precautions, operation and fire hazard.

E. Contractor shall provide, maintain and remove at its sole expense upon completion of Work, all temporary rigging, scaffolding, hoisting equipment, rubbish chutes, ladders, barricades, lights and all other protective structures or devices necessary for safety of workers and public property as required to complete all Work. Contractor shall repair all damage done to existing or new work.

1.7 LANDSCAPING MAINTENANCE & PROTECTION ON EXISTING SITES

A. Contractor shall properly maintain existing turf, trees, plants, and landscaping which are in work areas and are to remain.

B. Contractor shall protect existing turf, plants, trees and landscaping from injury, and afford reasonable access for their maintenance.

C. Contractor shall maintain existing landscape irrigation systems operational in ALL turf and landscaping areas to remain, or provide temporary irrigation. Coordinate any “shut-down” of landscape irrigation (including electrical, plumbing, or any other work) with District and Construction Manager prior to beginning work. Contractor shall replace all damaged or dead landscaping caused by his failure to protect same.

1.8 FIRE SAFETY DURING CONSTRUCTION

A. General: Throughout entire construction period, Contractor shall maintain site and buildings in accordance with Uniform Fire Code (U.F.C.), latest adopted edition, Chapter 33.

B. Access: Fire Department access shall be established and maintained in accordance with Section 3310 U.F.C.

C. Combustible Debris: Combustible debris shall not be accumulated. Combustible debris, rubbish, waste material and trash shall be removed from buildings as often as practical and shall not be burned on site.

D. Water Supply: Water mains and hydrants shall be operational in accordance with Sections 3312 and 3313 U.F.C.

E. Fire Protection:

1. When building is protected by fire-protection systems, such systems shall be maintained operational at all times during alteration. When alteration requires modification of a portion of a fire-protection system, remainder of system shall be kept in service. When it is necessary to shut down entire system, a fire watch shall be kept on site until system is returned to service.

F. Exits: Required exit components shall be maintained in accordance with Section 3311.2 U.F.C.

G. Fire-Resistive Assemblies and Construction: Fire resistive assemblies and construction shall be maintained in accordance with Sections 703 U.F.C.

H. Fire Safety during Demolition: Demolition of buildings shall be in accordance with U.F.C., Chapter 33.

END OF SECTION

SECTION 01 66 00

STORAGE AND PROTECTION

PART 1 – GENERAL

1.01 SUMMARY

A. Protect products scheduled for use in the Work by means including, but not necessarily limited to, those described in this Section.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to the General Conditions and Supplementary Conditions.
2. Additional procedures also may be prescribed in other Sections of these Specifications.

1.02 QUALITY ASSURANCE

A. Include within the Contractor's quality assurance program such procedures as are required to assure full protection of work and materials.

1.03 MANUFACTURERS' RECOMMENDATIONS

A. Except as otherwise approved by the District, determine and comply with manufacturers' recommendations on product handling, storage, and protection.

1.04 PACKAGING

A. Deliver products to the job site in their manufacturer's original container, with labels intact and legible.

1. Maintain packaged materials with seals unbroken and labels intact until time of use.
2. Promptly remove damaged material and unsuitable items from the job site, and promptly replace with material meeting the specified requirements, at no additional cost to the Owner.

B. The District may reject as non-complying such material and products that do not bear identification satisfactory to the District as to manufacturer, grade, quality, and other pertinent information.

1.05 PROTECTION

A. Protect finished surfaces, including jambs and soffits of openings used as passageways, through which equipment and materials are handled.

B. Provide protection for finished surfaces in traffic areas prior to allowing equipment or materials to be moved over such surfaces.

C. Maintain finished surfaces clean, unmarred, and suitably protected until accepted by the Owner.

1.06 REPAIRS AND REPLACEMENTS

A. In event of damage, promptly make replacements and repairs to the approval of the Architect and at no additional cost to the Owner.

B. Additional time required to secure replacements and to make repairs will not be considered by the District to justify an extension in the Contract Time of Completion.

END OF SECTION

SECTION 01 71 00

CLEANING

PART 1- GENERAL

1.01 DESCRIPTION

A. Work included: Throughout the construction period, maintain the buildings and site in a standard of cleanliness as described in this section, including site, public roadway and existing buildings adjacent to new construction.

B. Related work described elsewhere: In addition to standards described in this section, comply with all requirements for cleaning up as described in various other sections of these Specifications.

1.02 QUALITY ASSURANCE

A. Inspection: Daily, and more often if necessary, conduct inspection to verify that requirements of cleanliness are being met.

B. Codes and standards: In addition to the standards described in this section, comply with all pertinent requirements of governmental agencies having jurisdiction.

PART 2- PRODUCTS

2.01 CLEANING MATERIALS AND EQUIPMENT

A. Provide all required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

2.02 COMPATIBILITY

A. Use only cleaning materials and equipment that are compatible with the surface being cleaned as recommended by the manufacturer of the material or as approved by the Architect.

PART 3- EXECUTION

3.01 PROGRESS CLEANING

A. General:

1. Retain all stored items in an orderly arrangement allowing maximum access, not impeding drainage or traffic, and providing the required protection of materials.
2. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of this work.
3. At least twice each month and more often if necessary, completely remove all scrap, debris, and waste material from the jobsite.
4. Provide adequate storage for all items awaiting removal from the jobsite, observing all requirements for fire protection and protection of the ecology.

B. Site:

1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage. Broom sweep and hose down all adjacent haul roads and remove all debris daily.
2. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site; re-stack, tidy, or otherwise service all arrangements to meet the requirements of Paragraph 3.1 A.1 above.
3. Maintain the site in a neat and orderly condition at all times.

C. Structures:

1. Weekly, and more often if, necessary, inspect the structures and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.
2. Clean interior spaces prior to start of finish painting; continue cleaning on an as-needed basis until painting is finished. Schedule operations so dust and other contaminants will not fall on wet or newly-coated surfaces.

3.2 FINAL CLEANING

A. Definition: Except as otherwise specifically provided, “clean,” for the purpose of this Article, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality cleaning maintenance equipment and materials.

B. General: Prior to completion of the work, remove from the jobsite all tools, surplus materials, equipment, buildings, sheds, scrap, debris, and waste. Conduct final progress cleaning as described in Article 3.1 above.

C. Site: Unless otherwise specifically directed by the Architect, broom-clean all paved areas on the site and all public paved areas directly adjacent to the site. Pressure wash paved areas as necessary to completely remove all resultant debris.

D. Landscaped Areas: Prior to completion of the work, rake all planter and landscaped areas clean of scraps, debris, waste, and sandblast residuals. Wash down all trees, shrubs, plants and grass to be free of residual dust and particles.

E. Structures:

1. Exterior: Visually inspect all exterior surfaces and remove all traces of soil, waste material, smudges, labels, and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. Remove all protective materials and residual adhesives utilized in securing protective materials. If necessary to achieve a uniform degree of exterior cleanliness, hose down the exterior of the structure. In the event of stubborn stains not removable with water, the Architect may require light sandblasting or other cleaning at no additional cost to the District.
2. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces.
3. Wash and shine glazing and mirrors. Polish glossy surfaces to a clear shine. Dust all finish surfaces. Remove all sawdust from interior of all casework. Vacuum all carpeted areas and verify no damage or stains. Wax all resilient flooring to a high gloss finish.
4. Timing: Schedule final cleaning as approved by Project Manager to enable the District to accept completely clean project.

3.3 CLEANING DURING DISTRICT’S OCCUPANCY

A. The District is occupying certain areas of the work . Responsibilities for interim and final cleaning of the occupied spaces shall be as determined by the Architect or Construction Manager in accordance with the General Conditions of the Contract.

END OF SECTION

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 – GENERAL

1.01 SUMMARY

A. This Section establishes general requirements pertaining to cutting (including excavating), fitting, and patching of the Work required to:

1. Make the several parts fit properly;
2. Uncover work to provide for installing, inspecting, or both, of ill-timed work;
3. Remove and replace work not conforming to requirements of the Contract Documents; and
4. Remove and replace defective work.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. In addition to other requirements specified, upon the District's request uncover work to provide for inspection by the District of covered work, and remove samples of installed materials for testing.
3. Do not cut or alter work performed under separate contracts without the District's written permission.

1.02 SUBMITTALS

A. Request for District's consent:

1. Prior to cutting which affects structural safety, submit written request to the Project Manager for permission to proceed with cutting.
2. Should conditions of the Work, or schedule, indicate a required change of materials or methods for cutting and patching, so notify the Project Manager and secure his written permission and the required Change Order prior to proceeding.

B. Notices to the Project Manager:

1. Prior to cutting and patching performed pursuant to the District's instructions, submit cost estimate to the Project Manager. Secure the Project Manager's approval of cost estimates and type of reimbursement before proceeding with cutting and patching.
2. Submit written notice to the Project Manager designating the time the Work will be uncovered, to provide for the District's observation.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the work of this Section.

PART 2 – PRODUCTS

2.01 MATERIALS

A. For replacement of items removed, use materials complying with pertinent Sections of these Specifications.

2.02 PAYMENT FOR COSTS

A. The Owner will reimburse the Contractor for cutting and patching performed pursuant to a written Change Order, after claim for such reimbursement is submitted by the Contractor. Perform other cutting and patching needed to comply with the Contract Documents at no additional cost to the Owner.

PART 3 – EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Inspect existing conditions, including elements subject to movement or damage during cutting, excavating, patching, and backfilling.
2. After uncovering the work, inspect conditions affecting installation of new work.

B. Discrepancies:

1. If uncovered conditions are not as anticipated, immediately notify the Architect and secure needed directions.
2. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION PRIOR TO CUTTING

A. Provide required protection including, but not necessarily limited to, shoring, bracing, and support to maintain structural integrity of the Work.

3.3 PERFORMANCE

A. Perform required excavating and backfilling as required under pertinent other Sections of these Specifications and OSHA standards for such work.

1. Perform cutting and demolition by methods which will prevent damage to other portions of the Work and provide proper surfaces to receive installation of repair and new work.
2. Perform fitting and adjusting of products to provide finished installation complying with the specified tolerances and finishes.
3. Typically chip back existing adjoining plaster surfaces to expose the lath and building paper to permit proper lapping on new infill materials.

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Closeout Procedures.

B. Final Cleaning.

C. Pest Control.

D. Adjusting.

E. Demonstration and Instructions.

F. Project Record Documents.

G. Operation and Maintenance Data.

H. Warranties.

I. Spare Parts and Maintenance Materials.

1.2 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect's review.

B. Prepare and submit to Architect a list of items to be completed or corrected, the value of the items on the list, and reasons why the Work is not complete.

C. Submit written request to Architect for review of Work.

D. Submit warranties, bonds, service agreements, certifications, record documents, maintenance manuals, receipt of spare parts and similar closeout documents.

E. Terminate and remove temporary facilities from Project site.

F. Provide submittals to Architect that are required by governing or other authorities.

G. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.3 FINAL CLEANING

A. Execute final cleaning prior to final review by Architect.

B. Vacuum carpeted and soft surfaces. Shampoo if visible stains exist.

C. Clean debris from roofs, gutters, downspouts, and drainage systems.

D. Clean site; sweep paved areas, rake clean landscaped surfaces.

E. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.1 PROJECT RECORD DOCUMENTS

A. Maintain on site, one set of the following record documents; record actual revisions to the Work in contrasting color.

1. Contract Drawings.

2. Specifications.

3. Addenda.

4. Change Orders and other Modifications to the Contract.

5. Reviewed shop drawings, product data, and samples.

B. Store Record Documents separate from documents used for construction.

C. Record information concurrent with construction progress.

D. Specifications: Legibly mark and record at each Product Section in contrasting color ink, description of actual Products installed, including the following:

1. Manufacturer's name and product model and number.

2. Supplier and installer=s name and contact information.

3. Changes made by Addenda and Modifications.

E. Contract Drawings and Shop Drawings: Legibly mark each item in contrasting color ink to record actual construction including:

1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.

3. Field changes of dimension and detail.

4. Details not on original Contract Drawings.

5. Revisions to electrical circuitry and locations of electrical devices and equipment.

6. Note change orders, alternate numbers, and similar information, where applicable.

7. Identify each record drawing with the written designation of ARECORD DRAWING@ located in prominent location.

F. Record Digital Data Files: Immediately before inspection for Substantial Completion, review marked-up record prints with Architect. When authorized, prepare three full sets of corrected digital data files of the Contract Drawings, as follows:

1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.

2. Format: Annotated PDF electronic file with comment function enabled.

3. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.

4. Refer instances of uncertainty to Architect for resolution.

5. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.

   (a) Refer to Division 01 ASubmittal Procedures@ for requirements related to use of Architect's digital data files.

   (b) Architect will provide data file layer information. Record markups in separate layers.

G. Final Property Survey: Under the provisions of Division 01.

H. Record Construction Schedule: Under the provisions of Division 01.

I. Submit documents to Architect at time of Substantial Completion.

1.2 OPERATION AND MAINTENANCE DATA

A. Summary:

1. Organize operation and maintenance data with directory.

2. Provide operation and maintenance manuals for products, systems, subsystems, and equipment.

3. Refer to Divisions 2 thru 49 for specific operation and maintenance manual requirements for the Work in those Divisions.

1.1 WARRANTIES

A. Commencement of warranties shall be date of Substantial Completion.

B. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

C. Provide duplicate copies in operation and maintenance manuals.

D. Execute and assemble documents from subcontractors, suppliers, and manufacturers.

E. Submit prior to final Application for Payment.

F. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of warranty on the work that incorporates the products.

G. Manufacturer's disclaimer and limitations on product warranties do not relieve suppliers, manufacturer's, and subcontractors required to countersign special warranties with Contractor.

H. When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

I. When work covered by warranty has failed and has been corrected, reinstate warranty by written endorsement. Reinstated warranty shall be equal to original warranty with equitable adjustment for depreciation.

J. Upon determination that Work covered by warranty has failed, replace or repair Work to an acceptable condition complying with requirements of the Contract Documents.

1.2 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.

B. Deliver to Project site and place in location as directed.

C. Obtain signed receipt for delivery of materials and submit prior to request for final review by Architect.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 02 41 16

DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes: Furnishing labor, materials and equipment necessary for demolition, dismantling, cutting and alterations as indicated, specified, or required for completion of the Work. Includes items such as the following:

1. Demolition of existing roofing.

2. Protection of existing improvements to remain.

3. Removing debris, waste materials, and equipment.

4. Removal of items for performance of the Work.

C. Related Sections:

1. Division 01: Summary of the Project.

2. Division 01: Cutting and Patching

3. Division 01: Construction Facilities and Temporary Controls.

1.02 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings indicating the extent of items and systems to be removed. Indicate items to be salvaged or items to be protected during demolition. Indicate locations of utility terminations and the extent of abandoned lines to be removed. Include details indicating methods and location of utility terminations.

1.03 QUALITY ASSURANCE

A. Perform the Work of this section by workers skilled in the demolition of buildings and structures. Perform the Work of this section under direct superintendence at all times.

B. Prior to commencement of Work, schedule a walkthrough with the Owner's representative, to confirm Owner property items have been removed from scheduled Work areas. Identify and mark remaining property items and schedule their removal.
"Contractor to arrange and visit District Drawing Vault to review and copy necessary As-Built drawings within 10 working days from award of Bid".

C. Coordinate demolition for the correct sequence, limits, and methods. Schedule demolition Work to create least possible inconvenience to the public and facility operations.

D. Related Standard: American National Standard A10.6-2006

1.04 PROJECT CONDITIONS

A. Drawings may not indicate in detail all demolition Work to be performed. Examine existing conditions to determine the full extent of required demolition.

B. Repair damage to existing improvements or damage due to excessive demolition.

C. Provide all measures to avoid excessive damage from inadequate or improper means and methods, improper shoring, bracing or support.

D. If conditions are encountered that varies from those indicated, promptly notify the Architect for clarification before proceeding.

PART 2 - PRODUCTS

2.01 HANDLING OF MATERIALS

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

B. Items scheduled for reuse shall be stored on the Project site and protected from damage, theft and other deleterious conditions.

PART 3 - EXECUTION

3.01 GENERAL

A. Protection:

1. Do not commence demolition until safety partitions, barricades, warning signs and other forms of protection are installed. Refer to Division 01: Construction Facilities and Temporary Controls.

2. Provide all safeguards, including warning signs, lights and barricades, for protection of workers, occupants, and the public.

B. If, at any time, safety of existing construction appears to be endangered, take immediate measures to correct such conditions; cease operations and immediately notify the Architect and Owner's representative.

3.02 DEMOLITION

A. Do not throw or drop materials. Furnish ramps or chutes as required by the Work.

B. Remove existing construction only to extent necessary for proper installation of Work and interfacing with existing construction. Cut back finished surfaces to straight, plumb or level lines as required for a smooth transition.

C. Where openings are cut oversize or in improper locations, replace or repair to required condition.

3.03 CUTTING EXISTING CONCRETE

A. Cutting of existing concrete shall be performed by skilled workers familiar with the requirements and space necessary for placing concrete. Perform concrete cutting with concrete cutting wheels and hand chisels. Do not damage concrete intended to remain.

B. Extent of cutting of structural concrete shall be as indicated on Drawings. Cutting of non-structural concrete shall be as indicated on Drawings or as reviewed by the Architect or structural engineer. Replace concrete demolished in excess of amounts indicated.

C. Prior to cutting or coring concrete, determine locations of hidden utilities or other existing improvements and provide necessary measures to protect them from damage.

3.04 REMOVAL OF EXISTING PLUMBING AND ELECTRICAL EQUIPMENT AND SERVICES

A. Remove existing plumbing and electrical equipment fixtures and services not indicated for reuse and not necessary for completion of the Work. Remove abandoned lines and cap unused portions of existing lines.

3.05 REMOVAL OF OTHER MATERIALS

A. Masonry: Cut back to joint lines and remove mortar without damaging units to remain. Allow space for repairs to backing where applicable.

B. Woodwork: Cut or remove to a joint or panel line.

C. Roofing: Remove as required, including accessory components such as insulation and flashings. At penetrations through existing roofing, trim cut edges back to sound roofing with openings restricted to the minimum size necessary to receive Work.

D. Sheet Metal: Remove back to joint, lap, or connection. Secure loose and unfastened ends or edges and provide a watertight condition. Re-seal as required.

E. Glass: Remove broken or damaged glass and clean rebates and stops of glazing channels.

F. Modular materials such as acoustical ceiling panels, resilient tile, or ceramic tile: Remove to a natural joint without leaving damaged or defective Work where joining new Work. After flooring removal, clean substrates to remove setting materials and adhesives.

G. Gypsum Board: Remove to a panel joint line on a stud or support line.

H. Plaster: Saw cut plaster on straight lines, leaving a minimum 2 inch width of firmly attached metal lath for installing new lath and plaster.

I. Remove existing improvements not specifically indicated or required but necessary to perform Work. Cut to clean lines, allowing for installation of Work.

3.06 PATCHING

A. Patch and/or repair materials to remain when damaged by the performance of the Work of this section. Finish material and appearance of patch and/or repair Work shall match existing.

3.07 CLEANING

A. Clean existing materials to remain with appropriate tools and equipment.

B. Protect existing improvements during cleaning operations.

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

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

E. Remove waste and debris, other than items to be salvaged. Turn over salvaged items to Owner, or store and protect for reuse where required. Continuously clean up and remove items as demolition Work progresses.

F. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Supply and install Rough Carpentry work as indicated.

1.02 RELATED SECTIONS

A. Division 01: Quality Control.

B. Division 01: Testing and Laboratory Services.

C. Division 03: Concrete Formwork.

D. Division 03: Cast-In-Place Concrete.

E. Division 06: Finish Carpentry.

F. Division 09: Gypsum Board System.

1.03 SUBMITTALS

A. LEED Submittals: Submit in accordance with Division 01.

1.04 QUALITY ASSURANCE

A. All work shall be performed in accordance with the local codes and the most current DSA requirements. Where there is a question between the specifications, Architect/Contractor shall conform to the most constrictive requirement.

B. Douglas fir, larch or hemlock structural and framing lumber shall be graded in accordance with the "Standard Grading Rules" of the West Coast Lumber Inspection Bureau (WCLIB) or the "Western Lumber Grading Rules" of the Western Wood Products Association (WWPA) latest editions.

C. Redwood structural and framing lumber shall be graded in accordance with "Standard Specifications for Grades of California Redwood Lumber" of the Redwood Inspection Service, latest edition.

D. Each piece of lumber shall bear official grade mark of the association under whose rules it was graded, or official grade mark of another recognized grading agency using grading rules herein specified.

E. All 2x structural and framing members shall be air-dried to a moisture content not to exceed 19% before use.

F. Work of this Section shall comply with provisions of current edition of UBC and Title 24, see Section 01 45 29: Testing and Laboratory Services.

G. Plywood shall conform to requirements of "Product Standard PS 1-83 issued by the U.S. Department of Commerce, and shall be grade marked by a recognized grading agency (APA and PTL).

H. Each piece of preservative treated lumber shall be identified by the Quality Mark of an approved inspection agency in accordance with Title 24, see Section 01 54 29: Testing and Inspection.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Lumber: Structural and framing lumber shall be of the following species and grades unless noted otherwise on the drawings:

	USE	SPECIES	GRADE
1.	Subfloor, wall sheathing, roof sheathing and ceiling stripping.	Douglas Fir	"Construction" Board, Structural #1 only WCLIB; WWPA
2.	Beams, girders and truss members (5" and thicker, rectangular, width more than 2" greater than thickness) where exposed as finish members.	Douglas Fir WWPA	Select Structural
3.	Joists, rafters, lintels, posts, mullions and members(2" to 4" thick, 2" to 4" wide)	Douglas Fir	"Structural No. 1 Structural Light Framing, WCLIB;
4.	Other lumber (2" to 4" thick, 2" to 4" wide) not specified in subparagraph 5 above.	Douglas Fir	"Structural No. 1" and Framing WCLIB; WWPA
5.	Framing lumber (2" to 4" thick, 5" and wider).	Douglas Fir	"No. 1" and better Joists and Planks, WCLIB; WWPA.
6.	Mudsills and plates in contact with soil. treated	Douglas Fir	Same as subparagraphs 5 and 6.
7.	Sills or plates resting on concrete or masonry surfaces 6" or less above soil or finish grade.	Douglas Fir treated	Same as subparagraphs 5 and 6.
8.	Sills, foundations plates & sleepers which rest on concrete, masonry foundations, or are laid on concrete on concrete slab in direct contact with soil.	Douglas Fir treated	Same as subparagraphs 4 and 5.
9.	Miscellaneous nailing strips and blocks embedded in concrete or masonry.	Douglas Fir treated	Same as subparagraphs 4 and 5.

B. Plywood: Plywood used for structural purposes, shall be APA grade Structural I plywood. Other plywood used for non-structural purposes shall be exterior type, or Exposure 1.

C. Preservative Treated Wood:

1. Wood and plywood specified as treated wood shall be pressure treated wood in accordance with UBC 2303.1.8."

2. Seasoning: Treated lumber shall be air seasoned after treatment, for a minimum of 2 weeks before use.

3. Creosote shall not be used for treating wood in contact with painted or plastered surfaces.

4. When treated wood member has been notched, dapped, drilled or in any way cut into, such newly cut surfaces shall be painted with a heavy coat of same preservative material used in treatment of wood member.

D. Fire Retardant Protection: Wood and plywood specified as "Fire Retardant Protected Wood" shall be treated by approved methods and materials, and shall be dried, following treatment, to a maximum moisture content as follows: Solid sawn lumber 2" in thickness or less to 19%; and plywood to 15%.

E. Plywood subflooring shall be "Underlayment", Group 1, Exposure 1; of thickness indicated.

F. Mineral Fiber Panels: Shall be asbestos free, thickness as indicated.

G. Reused Materials: Sound lumber and timber which has been used for formwork may not be reused for stress carrying or non-stress carrying members. May not be used in any construction other than formwork.

PART 3 - EXECUTION

3.01 FASTENINGS

A. Nails and Spikes:

1. Use only common wire nails or spikes.

2. Whenever necessary to prevent splitting, holes shall be prebored for nails and spikes.

3. Nails in plywood shall not be overdriven.

4. Machine Applied Nailing: Use of machine nailing is subject to a satisfactory jobsite demonstration for each project and approval by the Project Architect or Structural Engineer and the Division of the State Architect Field Representative. Approval is subject to continued satisfactory performance. Machine nailing will not be approved in 5/16" plywood. If nailheads penetrate outerply more than would be normal for a hand hammer or if minimum allowable edge distances are not maintained, performance will be deemed unsatisfactory and material may be scrapped.

B. Lag Screws:

1. When placing lag screws in a wood member, prebore lead hole as recommended in CBC Title 24, CCR.

2. Lag screws which bear on wood shall be fitted with standard steel plate washers under head. Lag screws shall be screwed and not driven into place.

3. Lag screws applied in moisture rich environments or “wet” timber shall be galvanized to prevent degredation of both the lag screw and the material.

C. Bolts:

1. Lumber and timber to be fastened together with bolts shall be clamped together and holes for bolts bored true to line.

2. Bolts shall be fitted with steel plates or standard cut washers under heads and nuts. Bolts shall be tightened when installed and again just before completion of work.

3. Bolts applied in moisture rich environments or “wet” timber shall be galvanized to prevent degredation of both the bolt and the material.

D. Wood Screws: When placing wood screws, lead holes shall be prebored as recommended in CBC Title 24. Wood screws shall be appropriately selected for the application and treated as necessary to prevent corrosion

E. Framing Anchors: Framing anchors, joist hangers, ties and other mechanical fastenings shall be galvanized or have a rust-inhibitive coating. Nails and fastenings shall be of type recommended by manufacturer.

3.02 ERECTION

A. Stud Walls, Partitions and Furring:

1. Wood stud walls, partitions and vertical furring shall be constructed of members of size and spacing indicated. Provide single plate at bottom and double plate at top unless otherwise indicated. Interior, nonbearing non-shear partitions may be capped with a single top plate, installed to provide overlapping at corners and at intersections with other wall and partitions or by metal ties as detailed.

2. Walls and partitions shall have horizontal staggered blocking not less than 2" nominal thickness and same width as studs, fitted snugly, and nailed into studs. Blocking shall be at mid-height of partition or not more than 7'-0" on center vertically. Install wood backing on top of top plate wherever necessary for nailing of lath or gypsum board.

3. Walls, partitions and furred spaces shall have 2" nominal thickness wood firestops, same width as space to be firestopped, at ceiling line, mid-height of partition and at floor line. Firestops at floor line are not required when floor is concrete. If width of opening is such that more than one piece of lumber is necessary, provide 2 thicknesses of 1" nominal material laid with staggered joints.

4. Firestops shall be placed in all stud walls and partitions, including furred spaces, so that maximum dimension of any concealed space is not over 10'-0".

5. Corners, and where wood stud walls and wood vertical furring meet, shall be formed of triple studs. Openings in stud walls and partitions shall have headers as indicated and a minimum of 2 studs at jambs, one stud of which may be cut to support header in bearing.

6. Where wood masonry or concrete walls intersect, end stud shall be fastened at top, bottom and midheight with one 1/2" diameter bolt through stud and embedded in masonry or concrete a minimum of 4". Bolts shall have washers under nuts.

7. Sills under bearing, exterior or shear walls shall be bolted to concrete with 5/8" rd. by 12" long bolts spaced not more than 4'-0" on center. There shall be a bolt within 9" of each end of each piece of sill. Sills shall be placed and leveled with shims and washers placed and nuts tightened to level bearing after which space between sill and concrete shall be dry packed with cement grout. Non-bearing interior plates may be fastened to concrete with low velocity powder driven fasteners provided Structural Engineer's approval is obtained in writing, prior to use.

B. Beams, Girders and Joists:

1. Ends of wood beams, girders and joists which are 2'-0" or less above finished outside grade and which abut, but do not enter concrete or masonry walls, as well as wood blocking used in connection with ends of those members shall be treated with wood preservative.

2. Where wood beams, girders and joists enter masonry or concrete walls 2'-0" or less above outside wall, metal wall boxes or equivalent moisture barriers shall be provided between wood and masonry or concrete.

C. Furring: Where metal furring is not indicated or specified, provide wood furring at all points indicated and required for concealing conduit, piping, structural framing or other unfinished materials. Wood furring shall be 2x studs of required width. Vertical members contacting concrete or masonry shall be attached as specified for anchoring interior wood stud partitions.

D. Nailing Strips and Plates:

1. Provide wood nailing strips, plates and blocking indicated or required. Nailing strips in connection with metal work shall be bolted to metal. Wood nailing blocks for securing grounds shall be built into concrete, or masonry.

2. Nailing schedule shall comply to Title 24, see Division 01: Testing and Laboratory Services.

E. Wood Backing: Provide wood backing as indicated and as required to receive plumbing, electrical fixtures and equipment, cabinets, door stop plates and other fixed equipment.

END OF SECTION

SECTION 07 21 00

BUILDING INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Supply and installation of all building insulation, thermal and acoustical, including auxiliary insulation materials.

1.02 RELATED SECTIONS:

A. Division 03: Composite Insulating Concrete

B. Division 06: Rough Carpentry.

C. Division 07: Thermo-plastic Membrane Roofing – Adhered

D. Division 07: Firestopping and Smoke Seals.

1.03 QUALITY ASSURANCE:

A. Thermal Conductivity: Where insulation is identified by "R" value, provide thickness required to achieve indicated value.

B. Fire and Insurance Ratings: Comply with regulations as interpreted by State of California and other governing authorities.

C. Federal Specifications: Where compliance with FS standard is indicated, specified requirements for marking individual boards/batts/blankets are waived provided packages of units are labeled to show compliance.

1.04 SUBMITTALS:

A. All submittals shall be made in accordance with Division 01.

B. Material List: Provide a list of all materials to be provided under this Section and manufacturer's data as required to show compliance with specifications and fire codes.

C. LEED Submittals: Submit in accordance with Division 01.

1.05 PRODUCT HANDLING:

A. Deliver materials to the job site and store is a safe, dry place with all labels intact and legible at time of installation.

B. Use all means necessary to protect building insulation materials before, during, and after installation and to protect the installed work and materials from damage resulting from the work of other trades.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Thermal Insulation: Fiberglass batts or blankets with vapor resistant membrane. Insulation shall comply with Federal specifications HH-U-521F, Type II or III, T-24, CCR, Section 1713 and UBC Std. 42.1.

1. Thermal: Glass fiber batts, kraft paper vapor barrier, R-19 at exterior walls

2. Acoustical Insulation: glass fiber batts providing STC of 52 between classrooms

3. Thermal Wall Insulation:

a. Insulation shall be installed at all exterior walls unless noted otherwise shall have the following ratings:

1. Flame Spread: 25 or less.

2. Smoke Density: 450 or less.

b. R-Value: R-19 min.

4. Thermal Roof Insulation In Roof/Attic/Ceiling Spaces at all roofs unless noted otherwise:

a. Insulations and their facings shall be rated:

1. Flame Spread: 25 or less.

2. Smoke Density: 450 or less.

b. R-Value: R-30

5. Manufacturer/Products:

a. Manville as a standard of quality.

B. Acoustical Insulation: Fiberglass batts, with or without facing, thickness required for STC of 52 with wall assembly shown.

C. Auxiliary Insulating Materials:

1. Adhesive for bonding insulation: Type recommended by insulation manufacturer, and complying with fire-resistance requirements.

2. Mechanical Anchors and Support: Type and size specified or shown or, if not shown, as recommended by insulation manufacturer for type of application and condition of substrate.

PART 3 - EXECUTION

3.01 EXAMINATION:

A. Prior to work of this Section, inspect the installed work of other trades. Verify that such work is complete to a point where insulation may be installed in accordance with the original design and the manufacturer's recommendations.

3.02 INSTALLATION:

A. General:

1. Fit batt or blanket insulation snugly between framing members. Employ positive fasteners to prevent wall vibration caused settlement of insulation.

2. Maintain total insulation integrity over entire area to be insulated, including areas between closely spaced members.

3. Extend full thickness insulation over entire area to be insulated in a single layer, unless otherwise required. Use manufacturer's recommended clips to tightly fit batts at joints.

4. Cut and fit insulation tightly around pipes, conduits and all penetrations.

5. Do not compress batt insulation in excess of 10%.

6. Permanently restrain batt or blanket insulation from sagging.

7. Pack metal frames with insulation (head and jambs) which occur in sound insulated walls.

8. Where penetrations of walls, ceilings or roof required to be fire-rated occur and other trades are not required to install firestopping, this section shall install it per code standard, securely installed and capable of maintaining its integrity under fire.

9. Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with work.

B. Wall Insulation:

1. Exterior (thermal insulation):

a. Install batts between studs with vapor barrier facing room. Allow at least 3/4" air space between vapor barrier and wall finish.

b. All exterior stud walls shall have thermal insulation.

c. Install insulation on all exterior walls full height to join roof/ceiling attic area insulation.

d. Install Fire-Rated insulation on any portion of the wall occurring in a roof/ceiling attic area where the wall has no gypsum board covering.

2. Interior (Acoustical Insulation): As specified for thermal insulation.

C. Ceiling Insulation:

1. Install batts at mid-point between roof sheathing and bottom of rafters or joists, fitted and stapled into place.

a. Install Fire-Rated insulation at all roof/ceiling/attic areas within exterior walls.

2. Where roof rafters or joists are spaced 24 inches on center or more, install 18 gauge steel sag wire below batts, flush with bottom surface of batts. Place wires mid-way between, and running parallel to the rafters. Carry wire across bridging and securely staple or nail to the bridging. Securely nail or staple wires at end walls to blocking and stretch wires taut.

3.03 FIELD QUALITY CONTROL

A. Before closing in insulated spaces, Inspector shall examine all insulation work.

3.04 PROTECTION:

A. General: Protect installed insulation from harmful weather exposures and from possible physical abuses.

END OF SECTION

SECTION 07 52 00

MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Hot Applied 2-Ply Asphalt Roofing (StressPly, OptiMax, or Versiply). (2.9) (3.5)

B. Accessories. (2.19)

C. Edge Treatment and Roof Penetration Flashings. (2.20)(3.9)

1.2 REFERENCES

A. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.

B. ASTM D 312 - Standard Specification for Asphalt used in Roofing.

C. ASTM D 451 - Standard Test Method for Sieve Analysis of Granular Mineral Surfacing for Asphalt Roofing Products.

D. ASTM D 1079 Standard Terminology Relating to Roofing, Waterproofing and Bituminous Materials.

E. ASTM D 1227 Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.

F. ASTM D 2824 Standard Specification for Aluminum-Pigmented Asphalt Roof Coating.

G. Standard Test Method for Sampling and Testing Modified Bituminous Sheet Materials.

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

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

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

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

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

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

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. Underwriters Laboratory Class A Rating.Design Requirements:
2. Uniform Wind Uplift Load Capacity

C. Roof System membranes containing recycled or bio-based materials shall be third party certified through UL Environment.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

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.

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.

I. 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.

J. 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.

1.10 WARRANTY

A. Upon completion of the work, provide the Manufacturer's written and signed NDL 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. 30 years from date of acceptance.

B. 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. 2 years from date of acceptance.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Garland Company, Inc. (The); 3800 E. 91st St., Cleveland, OH 44105. ASD. Toll Free: 800-321-9336. Phone: 216-641-7500. Fax: 216-641-0633. Web Site: www.garlandco.com.

B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

C. The Products specified are intended and the Standard of Quality for the products required for this project. If other products are proposed the bidder must disclose in the bid the manufacturer and the products that they intend to use on the Project. If no manufacturer and products are listed, the bid may be accepted only with the use of products specified.
   1. Bidder will not be allowed to change materials after the bid opening date.
   2. If alternate products are included in the bid, the products must be equal to or exceed the products specified. Supporting technical data shall be submitted to the Architect/ Owner for approval prior to acceptance.
   3. In making a request for substitution, the Bidder/Roofing Contractor represents that it has:
      a. Personally investigated the proposed product or method, and determined that it is equal or superior in all respects to that specified.
      b. Will provide the same guarantee for substitution as for the product and method specified.
      c. Will 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. Base (Ply) Sheet: One ply bonded to the prepared substrate with Interply Adhesive:
1. StressBase 80:

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

C. Interply Adhesive: (1 and 2)
1. HPR All-Temp Asphalt:

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

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

F. Flashing Ply Adhesive:
1. Flashing Bond (not for use with KEE-Stone FB 60 Flashing):

G. Surfacing:
1. Surface Coatings
a. Garla-Brite:

2.3 ACCESSORIES:

A. Roof Insulation: In accordance with Section 07 22 16.

2.4 EDGE TREATMENT AND ROOF PENETRATION FLASHINGS

A. Pre-Manufactured Edge Metal: R-Mer Force Flash-less Snap-On Fascia Cover and Splice Plate.
1. Zinc-coated steel, ASTM A653, coating designation G-90, in thickness of 24 gauge, 22 gauge or 20 gauge, 36" to 48" by coil length, chemically treated, commercial or lock-forming quality
2. Aluminum, ASTM B209, alloy 3105-H14, in thickness of .032" nom. or .040" nom. or .050" nom. or .063" nom.

B. Pre-Manufactured Edge Metal: R-Mer Edge Snap-On Fascia Cover and Splice Plate.
1. Zinc-coated steel, ASTM A653, coating designation G-90, in thickness of 24 gauge, 22 gauge or 20 gauge, 36" to 48" by coil length, chemically treated, commercial or

lock-forming quality.
2. Aluminum, ASTM B209, alloy 3105-H14, in thickness of .032" nom. or .040" nom. or .050" nom. or .063" nom.

C. Pre-Manufactured Edge Metal: R-Mer Edge Extruded Fascia Cover and Splice Plate.
1. Aluminum, ASTM B209, alloy 3105-H14, in thickness of .063" min.

D. Pre-Manufactured Coping Cap: R-Mer Edge Coping Cap Cover and Splice Plate.
1. Zinc-coated steel, ASTM A653, coating designation G-90, in thickness of 24 gauge, 22 gauge or 20 gauge, 36" to 48" by coil length, chemically treated, commercial or lock-forming quality.
2. Aluminum, ASTM B209, alloy 3105-H14, in thickness of .040" nom. or .050" nom. or .063" nom

E. Pre-Manufactured Edge Metal: R-Mer Force Flash-less Snap-On Fascia Extruded Base Anchor and Components.
1. Base Anchor: 6005A-T61 extruded aluminum.
2. Compression Seal for top of anchor: TPE thermoplastic elastomer.
3. Sealant for Flange: Green-Lock Sealant XL: Single-component high performance 100% solids, interior and exterior polyether joint sealant.

F. Pre-Manufactured Edge Metal: R-Mer Edge Snap-On Fascia or Extruded Fascia Continuous Cant
1. Zinc-coated steel, ASTM A653, coating designation G-90, in thickness of 0.0299 nom./22 gauge, 36" to 48" by coil length, chemically treated, commercial or lock-forming quality.

G. Pre-Manufactured Coping Cap: R-Mer Edge Coping Chairs
1. Zinc-coated steel, ASTM A653, coating designation G-90, in thickness of 0.0635 nom./ 16 gauge, 36" to 48" by coil length, chemically treated, commercial or lock-forming quality.

H. Pre-Manufactured Edge Metal Finishes:
1. Exposed and unexposed surfaces for mill finish flashing, fascia, and coping cap, as shipped from the mill
2. Exposed surfaces for coated panels:
a. Steel Finishes: fluorocarbon finish. Epoxy primer baked both sides, .2-.25 mils thickness as approved by finish coat manufacturer.
Weathering finish as referred by National Coil Coaters Association (NCCA).
Provided with the following properties.
1) Pencil Hardness: ASTM D3363, HB-H / NCCA II-2.
2) Bend: ASTM D-4145, O-T / NCCA II-19
3) Cross-Hatch Adhesion: ASTM D3359, no loss of adhesion
4) Gloss (60 deg. angle): ASTM D523, 25+/-5%
5) Reverse Bend: ASTM D2794, no cracking or loss of adhesion
6) Nominal Thickness: ASTM D1005
a) Primer: 0.2 mils
b) Topcoat, 0.7 mils min
c) Clear Coat (optional, only used with 22 ga. steel) 0.3 mils
7) Color: Provide as specified. (Subject to minimum quantities)

I. Manufactured Flashing Ply: R-MER Ply galvalume steel and modified membrane roof termination/flashing system comprised of a flexible, tie-in membrane, factory-bonded within a watertight, mechanical seal to a galvalume steel vertical flashing or fascia reveal profile.

Siliconized modified polyester, epoxy primer baked both sides. Modified membrane is a 180 mil, Styrene-Butadiene-Styrene SBS (Styrene-Butadiene-Styrene) rubber modified membrane reinforced with a dual fiberglass scrim.

1. Tensile Strength, ASTM D 5, 147
    a. 2 in/min. @ 73.4 +/- 3.6 deg. F MD 210 lbf/in CMD 210 lbf/in
    b. 50 mm/min. @ 23 +/- 3 deg. C MD 36.75 kN/m CMD 36.75 kN/m
2. Tear Strength, ASTM D 5147
    a. 2 in/min. @ 73.4 +/- 3.6 deg. F MD 250 lbf CMD 250 lbf
    b. 50 mm/min. @ 23 +/- 3 deg. C MD 1112 N CMD 1112 N
3. Elongation at Maximum Tensile, ASTM D5147
    a. 2 in/min. @ 73.4 +/- 3.6 deg. F MD 6.0% CMD 6.0%
    b. 50 mm/min. @ 23 +/- 3 deg. C MD 6.0% CMD 6.0%
4. Low Temperature Flexibility, ASTM D5147: Passes -30 deg. F (-34 deg. C)
5. Coating Properties:
    a. Pencil Hardness, NCCA II-2 - ASTM D3363, F-H
    b. Bend, NCCA II-19, ASTM D 4145, 2-T
    c. Adhesion / Cross-Hatch, ASTM D3359, no loss of adhesion
    d. Gloss (60 deg. angle), ASTM D 523, 90 +/- 5%
    e. Reverse Impact, ASTM D 2794 no cracking or loss of adhesion
    f. Nominal Thickness, ASTM D 1005, primer and topcoat 1.0 mils.

J. Flashing Boot - Rubbertite Flashing Boot: Neoprene pipe boot for sealing single or multiple pipe penetrations adhered in approved adhesives as recommended and furnished by the membrane manufacturer.

K. Vents and Breathers: Heavy gauge aluminum and fully insulated vent that allows moisture and air to escape but not enter the roof system as recommended and furnished by the membrane manufacturer.

L. Pitch pans, Rain Collar 24 gauge stainless or 20oz (567gram) copper. All joints should be welded/soldered watertight. See details for design.

M. Drain Flashings should be 4lb (1.8kg) sheet lead formed and rolled.

N. Plumbing stacks should be 4lb (1.8kg) sheet lead formed and rolled.

O. Liquid Flashing - Tuff-Flash: An asphaltic-polyurethane, low odor, liquid flashing material designed for specialized details unable to be waterproofed with typical modified membrane flashings.

1. Tensile Strength, ASTM D 412: 400 psi
2. Elongation, ASTM D 412: 300%
3. Density @77 deg. F 8.5 lb/gal typical

P. Fabricated Flashings: Fabricated flashings and trim are specified in Section 07 62 00 - Sheet Metal Flashing and Trim.

1. Fabricated flashings and trim shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the CDA Copper Development Association "Copper in Architecture - Handbook" as applicable.

Q. Manufactured Roof Specialties: Shop fabricated copings, fascia, gravel stops, control joints, expansion joints, joint covers and related flashings and trim are specified in Section 07 71 23.

1. Manufactured roof specialties shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the NRCA "Roofing and Waterproofing

Manual" as applicable.

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. Metal Deck: Metal deck shall be installed as specified in Section
   1. Fastening of the deck should comply with the anticipated live and dead loads pertaining to the building as well as applicable Code.
   2. Steel decks shall be minimum 22-gauge factory galvanized or zinc alloy coated for protection against corrosion.
   3. Suitable insulation shall be mechanically attached as recommended by the insulation manufacturer.
   4. Decks shall comply with the gauge and span requirements in the current Factory Mutual FM Approval Guide and be installed in accordance with Loss Prevention Data Sheet 1-28 or specific FM approval.
   5. When re-roofing over steel decks, surface corrosion shall be removed, and repairs to severely corroded areas made. Loose or inadequately secured decking shall be fastened, and irreparable or otherwise defective decking shall be replaced.

C. Re-Roofing Applications:
   1. Remove existing roof flashings from curbs and parapet walls down to the surface of the roof. Remove existing flashings at roof drains and roof penetrations.

2. Remove all wet, deteriorated, blistered or delaminated roofing membrane or insulation and fill in any low spots occurring as a result of removal work to create a smooth, even surface for application of new roof membranes.
3. Install new wood nailers as necessary to accommodate insulation/recovery board or new nailing patterns.
4. When mechanically attached, the fastening pattern for the insulation/recovery board shall be as recommended by the specific product manufacturer.
5. Re-roofing over coal tar pitch requires a mechanically attached recovery board or insulation and a base sheet prior to the application of roofing system.
6. Existing roof surfaces shall be primed as necessary with asphalt primer meeting ASTM D 41 and allowed to dry prior to installing the roofing system.

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 06 11 00.
   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 07 62 00 or Section 07 71 23. 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. Surface Coatings: Apply roof coatings in strict conformance with the manufacturer's recommended procedures.

3.5 INSTALLATION EDGE TREATMENT AND ROOF PENETRATION FLASHING

A. Coping Cap:
1. Minimum flashing height is 8 inches (203 mm) above finished roof height. Maximum flashing height is 24 inches (609 mm). Prime vertical wall at a rate of 100 square feet per gallon and allow to dry.
2. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).
3. Attach tapered board to top of wall.
4. Install base flashing ply covering entire wall and wrapped over top of wall and down face with 6 inches (152 mm) on to field of roof and set in cold asphalt. Nail membrane at 8 inches (203 mm) o.c.
5. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all seams and allow to cure and aluminize.
6. Install continuous cleat and fasten at 6 inches (152 mm) o.c. to outside wall.
7. Install new metal coping cap hooked to continuous cleat.
8. Fasten inside cap 24 inches (609 mm) o.c. with approved fasteners and neoprene washers through slotted holes, which allow for expansion and contraction.

B. Roof Drain:
   1. Plug drain to prevent debris from entering plumbing.
   2. Taper insulation to drain minimum of 24 inches (609 mm) from center of drain.
   3. Run roof system plies over drain. Cut out plies inside drain bowl.
   4. Set lead/copper flashing (30 inch square minimum) in 1/4 inch bed of mastic. Run lead/copper into drain a minimum of 2 inches (50 mm). Prime lead/copper at a rate of 100 square feet per gallon and allow to dry.
   5. Install base flashing ply (40 inch square minimum) in bitumen.
   6. Install modified membrane (48 inch square minimum) in bitumen.
   7. Install clamping ring and assure that all plies are under the clamping ring.
   8. Remove drain plug and install strainer.

3.6 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.

3.7 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.

3.8 FIELD QUALITY CONTROL

A. Inspection: Provide manufacturer's field observations at start-up and at intervals of approximately 30 percent, 60 percent and 90 percent completion. 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.

3.9 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 FR Mineral: 145 mil SBS (Styrene-Butadiene-Styrene) mineral surfaced, rubber modified roofing membrane with fire retardant characteristics, and dual fiberglass reinforced scrim. ASTM D 6163, Type III Grade G
    a. Tensile Strength, ASTM D 5147
        1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 225 lbf/in XD 225 lbf/in
        2) 50 mm/min. @ 23 +/- 2 deg. C MD 39.0 kN/m XD 39.0 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 1335 N XD 1335 N
    c. Elongation at Maximum Tensile, ASTM D 5147
        1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 6% XD 8%
        2) 50 mm/min. @ 23 +/- 2 deg. C MD 6% XD 8%
    d. Low Temperature Flexibility, ASTM D 5147, Passes -15 deg. F (-26 deg. C)

C. Interply Adhesive:
1. HPR All-Temp Asphalt: Hot Bitumen, high penetration, high softening point mopping asphalt having the following characteristics:
    a. Softening Point 225 deg. F - 235 deg. F
    b. Flash Point 525 deg. F
    c. Penetration @ 77 deg. F 16-20 units
    d. Ductility @ 77 deg. F 1.5-2.0 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. Flashing Bond: Asphalt roofing mastic V.O.C. compliant, ASTM D 4586, Type II trowel grade flashing adhesive.
      a. Non-Volatile Content ASTM D 4479 70 min.
      b. Density ASTM D 1475 8.3 lbs./gal. (1kg/l)
      c. Flash Point ASTM D 93 103 deg. F (39 deg. C)

F. Surfacing:
   1. Flashing Cap (Ply) Sheet:
      a. StressPly FR Mineral: 145 mil SBS (Styrene-Butadiene-Styrene) mineral surfaced, rubber modified roofing membrane with fire retardant characteristics, and dual fiberglass reinforced scrim. ASTM D 6163, Type III Grade G
         1) Tensile Strength, ASTM D 5147
            a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 225 lbf/in XD 225 lbf/in
            b) 50 mm/min. @ 23 +/- 2 deg. C MD 39.0 kN/m XD 39.0 kN/m
         2) Tear Strength, ASTM D 5147
            a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 300 lbf XD 300 lbf
            b) (50 mm/min. @ 23 +/- 2 deg. C MD 1335 N XD 1335 N
         3) Elongation at Maximum Tensile, ASTM D 5147
            a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 6% XD 8%
            b) 50 mm/min. @ 23 +/- 2 deg. C MD 6% XD 8%
         4) Low Temperature Flexibility, ASTM D 5147, Passes -15 deg. F (-26 deg. C)
   2. Surface Coatings:
      a. Surfacing:
         1) Garla-Brite: ASTM D 2824 aluminum coating non-fibered aluminum roof coating non-fibered aluminum roof coating having the following characteristics:
            a) Flash Point 103 deg. F (39 deg. C) min.
            b) Weight/Gallon 7.9 lbs./gal. (1.0 g/cm3)

END OF SECTION

SECTION 07 56 00

FLUID APPLIED ROOFING RESTORATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Mineral Modified Bitumen Surface Roof Restoration

B. Accessories

C. Edge Treatment and Roof Penetration Flashings

1.2 REFERENCES

A. ASTM C 78 - Standard Test Method for Flexural Strength of Concrete.

B. ASTM C 92 - Standard Test Methods for Sieve Analysis and Water Content of Refractory Materials.

C. ASTM D 93 - Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester.

D. ASTM D 562 - Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer.

E. ASTM D 2196 - Standard Test Methods for Rheological Properties of Non-Newtonian Materials by Rotational (Brookfield type) Viscometer.

F. ASTM D 4212 - Standard Test Method for Viscosity by Dip-Type Viscosity Cups.

G. SMACNA Architectural Sheet Metal Manual.

H. National Roofing Contractors Association (NRCA) - Roofing and Waterproofing Manual.

1.3 SYSTEM DESCRIPTION

A. Mineral Modified Bitumen Surface Roof Restoration: Renovation work includes:
   1. Surface preparation: Remove dirt, and debris.
   2. Fascia Edges: Cut back edges. Prime, coat with mastic, cover with fabric.
   3. Parapets and Vertical Surfaces: Cut back and replace fabric base flashings. Prime, coat with mastic, cover with fabric.
   4. Metal Flashings: Repair/Replace metal flashings, pitch pockets, etc.
   5. Roof Repairs: Repair blisters, stressed or cracked membrane. Cut back, patch with primer/mastic/membrane.
   6. Primer: Prime surface.
   7. Partial Reinforcement: Install partial fabric reinforcement at all modified bitumen field/vertical flashing laps, side laps, end laps and details and base coat entire roof surface.
   8. Coating: Apply coating over entire roof surface.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

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 methods.

C. Shop Drawings: Submit shop drawings including installation details of fluid applied roofing and flashing prior to job start.

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

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

F. 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 manufacturer's current Application and Installation Guidelines and the 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 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 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 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. Storage temperatures should be between 60 degrees F to 80 degrees F (15.6 degrees to 26.7 degrees C). Indoor ventilated storage is recommended. 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.

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

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.

B. Weather Condition Limitations: Product application must not be done when rain or other conditions such as fog or heavy dew are possible within a 24 hour period. Roof surface must be at least 6 Fahrenheit degrees or 3 Celsius degrees above the dew point and rising.

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 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 of White-Knight Plus/ White-Stallion Plus, White-Knight Plus WC, LiquiTec and Cool-Sil coatings is 50 degrees F (10 degrees C) and rising.

1.9 WARRANTY

A. Warranty Period: 15 years.
   1. 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.
      a. Mineral Modified Roof Restoration:

B. Warranty Period: 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. 2 years from date of acceptance.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Garland Company, Inc. (The); 3800 E. 91st St., Cleveland, OH 44105. ASD. Toll Free: 800-321-9336. Phone: 216-641-7500. Fax: 216-641-0633. Web Site: http://www.garlandco.com.

B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 MINERAL MODIFIED BITUMEN SURFACE ROOF RESTORATION

A. LiquiTec:
   1. Primer: Garla-Block Primer is required only on new asphaltic repair material.
   2. Base: LiquiTec Base
   3. Coating: LiquiTec.
   4. Flashing: LiquiTec.
   5. Reinforcement:

a. Partial Reinforcement: Fabric reinforcement over existing membrane seams and all flashing penetrations.
    1) Reinforcement Materials:
        a) UniBond ST seam reinforcement tape

2.3 ACCESSORIES:

A. Roof Insulation: In accordance with Section 07 22 16 - Roof Board Insulation.

B. Nails and Fasteners: Non-ferrous metal or galvanized steel, except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel, Fasteners shall be self-clinching type of penetrating type as recommended by the deck manufacturer. Fasten nails and fasteners flush-driven through flat metal discs not less than 1 inch (25 mm) diameter. Omit metal discs when one-piece composite nails or fasteners with heads not less than 1 inch (25 mm) diameter are used.

C. Urethane Sealant - Tuff-Stuff MS: One part, non-sag sealant as approved and furnished by the membrane manufacturer for moving joints.
    1. Tensile Strength, ASTM D 412: 250 psi
    2. Elongation, ASTM D 412: 950%
    3. Hardness, Shore A ASTM C 920: 35
    4. Adhesion-in-Peel, ASTM C 92: 30 pli

D. Urethane Adhesive - Green-Lock Structural Adhesive: Single component, 100% solids structural adhesive as furnished and recommended by the membrane manufacturer.
    1. Elongation, ASTM D 412: 300%
    2. Hardness, Shore A, ASTM C 920: 50
    3. Shear Strength, ASTM D 1002: 300 psi

E. Silicone Dampproofing - Seal-A-Pore HP: Transparent and colorless solution designed to damp-proof above grade masonry surfaces as recommended and furnished by the membrane manufacturer.
    1. Density @77 degrees F 8.4 lb/gal min.
    2. Viscosity (Zahn #2 cup) Typical 14 sec.

F. Acrylic Damp-Proofing Tuff-Coat: Damp-proofing that provides heavy body protection while bridging small hair line cracks and masonry imperfections as recommended and furnished by the membrane manufacturer.
    1. Density @77 degrees F 12.25 lb/gal typical
    2. Viscosity, ASTM D 562: 95 KU

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

H. Non-Shrink Grout: GarRock all-weather fast setting chemical action concrete material to fill pitch pans.
    1. Flexural Strength, ASTM C 78: (modified) 7 days 1100psi
    2. High Strength, ASTM C 109: (modified) 24 days 8400lbs (3810kg)

I. Pitch Pocket Sealer - Universal Pitch-Pocket Sealer: Two-part, 100% solids, self-leveling, polyurethane sealant.

J. Glass Fiber Cant - Glass Cant: Continuous triangular cross Section made of inorganic fibrous glass used as a cant strip as recommended and furnished by the membrane

manufacturer.

2.4 EDGE TREATMENT AND ROOF PENETRATION FLASHINGS

A. Flashing Boot - Rubbertite Flashing Boot: Neoprene pipe boot for sealing single or multiple pipe penetrations adhered in approved adhesives as recommended and furnished by the membrane manufacturer.

B. Vents and Breathers: Heavy gauge aluminum and fully insulated vent that allows moisture and air to escape but not enter the roof system as recommended and furnished by the membrane manufacturer.

C. Pitch pans, Rain Collar 24 gauge stainless or 20oz (567gram) copper. All joints should be welded/soldered watertight. See details for design.

D. Drain Flashing should be 4lb (1.8kg) sheet lead formed and rolled.

E. Plumbing stacks should be 4lb (1.8kg) sheet lead formed and rolled.

F. Fabricated Flashing: Fabricated flashings and trim are specified in Section 07 62 00 - Sheet Metal Flashing and Trim.
   1. Fabricated flashings and trim shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the CDA Copper Development Association "Copper in Architecture - Handbook" as applicable.

G. Manufactured Roof Specialties: Manufactured copings, fascia, gravel stops, control joints, expansion joints, joint covers and related flashings and trim are specified in Section 07 71 23 - Manufactured Gutters and Downspouts.
   1. Manufactured roof specialties shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the NRCA "Roofing and Waterproofing Manual" as applicable.

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, including the removal of all wet insulation and defective materials as identified through a moisture detection survey such as an infrared scan and replacement with like-materials.
   1. Remove damaged roof flashings from curbs and parapet walls down to the surface of the roof. Remove damaged existing flashings at roof drains and roof penetrations.
   2. Remove all wet, deteriorated, blistered or delaminated roofing membrane or insulation and fill in any low spots with like materials occurring as a result of removal work to create a smooth, even surface for application of new roof membranes.
   3. Install new wood nailers as necessary to accommodate insulation/recovery board or

new nailing patterns.

4. When mechanically attached, the fastening pattern for the insulation/recovery board shall be as recommended by the specific product manufacturer.
5. Existing roof surfaces shall be primed as necessary and allowed to dry prior to installing the roofing system.

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, saturated materials, loose or brittle membrane or membrane flashings, etc. Verify that existing conditions meet the following requirements:
   1. Existing membrane is either fully adhered or that the membranes mechanical fasteners are secured and functional.
   2. Application of roofing materials over a brittle, damaged or poor condition roof membrane is not permitted.

D. Remove all loose dirt and foreign debris from the roof surface. Do not damage roof membrane in cleaning process.

E. Clean and seal all parapet walls, gutters and coping caps, 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 liquid membrane. All surface defects must be repaired/renovated and be made watertight. Any repairs must be with be only with materials compatible with the fluid-applied roofing restoration system.

3.3 INSTALLATION

A. General Installation Requirements:
   1. Install in accordance with manufacturer's current Application and Installation Guidelines and the NRCA Roofing and Waterproofing Manual.
   2. Adequate coating thickness is essential to performance. If the applicator is unfamiliar in gauging application rates, we suggest that a controllable area be measured and the specified material be applied. In all cases, all minimum specified material must be applied and proper minimum dry film thicknesses must be achieved. Care must be taken to ensure that all areas completed including all flashings, roof penetrations, etc. are coated sufficiently to ensure a watertight seal.
   3. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing the roof system.
   4. Insurance/Code Compliance: Where required by code, install and test the roofing system to comply with governing regulation and specified insurance requirements.
   5. Protect work from spillage of roofing materials and prevent materials from entering or clogging drains and conductors. Replace or restore adjacent work damaged by installation of the roofing system.

6. All primers must be top coated within 24 hours after application, preferably immediately after drying. Clean and re-prime if more time passes after priming.
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 Bitumen Surface 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. Liquid Flashings:
   a. Fascia Edges: Cut back edges. Prime with Rust-Go Primer, apply Coating, embed fabric reinforcement apply Top Coating.
   b. Parapets and Vertical Surfaces: Prime, apply Coating, embed fabric reinforcement apply Top Coating
   c. Metal Flashings: Prime, apply Coating.
3. Primer: Prime roof surfaces at a rate of 0.5 gallons per 100 SF.
4. Base Coat: Apply base coat at 2 gal./sq and let cure. Apply to the entire roof surface. Ensure adequate coating thickness is applied over all areas including vertical flashings, drains and other critical details.
5. Coating: Apply coating to entire roof surface as soon as possible after embedding reinforcement. Apply to entire roof surface perpendicular to base coat. Use special attention to coating flashings and other critical areas to build adequate membrane thickness.
   a. LiquiTec:
      1) Apply Coating at 2.0 gallons per 100 SF over the entire roof surface.

3.4 REPAIR OF EDGE TREATMENT AND ROOF PENETRATION FLASHING

A. General
1. Repair flashing in accordance with the requirements/recommendations of the Membrane manufacturer and as indicated on the manufacturer's standard drawings. Provide system with base flashing, edge flashing, penetration flashing, counter flashing, and all other flashings required for a complete watertight system.
2. Install and repair flashings concurrently with the roofing as the job progresses.
3. Terminate flashings as required by the membrane manufacturer.

B. Manufactured Roof Specialties: Manufactured copings, fascia, gravel stops, control joints, expansion joints, joint covers and related flashings and trim are provided as specified in Section 07 71 23 - Manufactured Gutters and Downspouts.
1. Manufactured roof specialties shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the National Roofing Contractor's Association "Roofing and Waterproofing Manual" as applicable.

C. Repairs of Existing Roof Penetrations and Flashings
1. Metal Edge:
   a. Inspect the nailers to assure proper attachment and configuration.
   b. Run one ply over the edge. Assure coverage of all wood nailers. Fasten plies with ring shank nails at 8 inches (203 mm) o.c.
   c. Install continuous cleat and fasten at 6 inches (152 mm) o.c.
   d. Install new metal edge hooked to continuous cleat and set in bed of roof

cement. Fasten flange to wood nailers every 3 inches (76 mm) o.c. staggered.
e. Prime metal edge at a rate of 100 square feet per gallon and allow to dry.
f. Strip in flange with base flashing ply covering entire flange in bitumen with 6 inches (152 mm) on to the field of roof. Assure ply laps do not coincide with metal laps.
g. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Seal outside edge with rubberized cement.

2. Roof Edge With Gutter:
   a. Inspect the nailer to assure proper attachment and configuration. Increase slope at metal edge by additional degree of slope in first board.
   b. Run one ply over the edge. Assure coverage of all wood nailers. Fasten plies with ring shank nails at 8 inches (203 mm) o.c.
   c. Install gutter and strapping.
   d. Install continuous cleat and fasten at 6 inches (152 mm) o.c.
   e. Install new metal edge hooked to continuous cleat and set in bed of roof cement. Fasten flange to wood nailer every 3 inches (76 mm) o.c. staggered.
   f. Prime metal edge at a rate of 100 square feet per gallon and allow to dry.
   g. Strip in flange with base flashing ply covering entire flange in bitumen with 6 inches (152 mm) onto the field of the roof. Assure ply laps do not coincide with metal laps.
   h. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof.
3. Scupper Through Roof Edge:
   a. Inspect the nailer to assure proper attachment and configuration.
   b. Run one ply over the edge. Assure coverage of all wood nailers. Fasten plies with ring shank nails at 8 inches (203 mm) o.c.
   c. Install a scupper box in a 1/4 inch (6 mm) bed of mastic. Assure all box seams are soldered and have a minimum 4 inch (101 mm) flange. Make sure all corners are closed and soldered. Prime scupper at a rate of 100 square feet per gallon and allow to dry.
   d. Fasten flange of scupper box to nailer every 3 inches (76mm) o.c. staggered.
   e. Strip in edge with base flashing ply covering entire area in bitumen with 6 inches (152 mm) on to the field of the roof.
   f. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all seams.
4. Scupper Through Wall:
   a. Inspect the nailer to assure proper attachment and configuration.
   b. Run one ply over nailer, into scupper hole and up flashing as in typical wall flashing detail. Assure coverage of all wood nailers.
   c. Install a scupper box in a 1/4 inch (6 mm) bed of mastic. Assure all box seams are soldered and have a minimum 4 inch (101 mm) flange. Make sure all corners are closed and soldered. Prime scupper at a rate of 100 square feet per gallon and allow to dry.
   d. Fasten flange of scupper box every 3 inches (76 mm) o.c. staggered.
   e. Strip in flange of scupper box with base flashing ply covering entire area with 6 inch (152 mm) overlap on to the field of the roof and wall flashing.
   f. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all seams.
5. Coping Cap:
   a. Minimum flashing height is 8 inches (203 mm) above finished roof height. Maximum flashing height is 24 inches (609 mm). Prime vertical wall at a rate of

100 square feet per gallon and allow to dry.
   b. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).
   c. Install base flashing ply covering entire wall and wrapped over top of wall and down face with 6 inches (152 mm) on to field of the roof and set in cold asphalt. Nail membrane at 8 inches (203 mm) o.c.
   d. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all seams and allow to cure and aluminize.
   e. Install coping cap per manufacturer's recommendations.
6. Surface Mounted Counterflashing/Coping Cap:
   a. Minimum flashing height is 8 inches (203 mm) above finished roof height. Prime vertical wall at a rate of 100 square feet per gallon and allow to dry.
   b. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).
   c. Install base flashing ply covering wall set in bitumen with 6 inches (152 mm) on to field of roof.
   d. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all seams and allow to cure and aluminize.
   e. Apply butyl tape to wall behind flashing. Secure termination bar through flashing, butyl tape and into wall. Alternatively use caulk to replace the butyl tape.
   f. Secure counterflashing set on butyl tape above flashing. Fasten 8 inches (203 mm) o.c. and caulk top of counterflashing.
   g. Attach tapered board to top of wall (minimum slope 1/4 -12). Do not use organic fiberboard or perlite.
   h. Cover tapered board and all exposed wood with base flashing ply. Fasten inside and out at 8 inches (203 mm) o.c.
   i. Install continuous cleat and fasten at 6 inches (152 mm) o.c. to outside wall.
   j. Install new metal coping cap hooked to continuous cleat.
   k. Fasten inside of cap 24 inch (609 mm) o.c. with approved fasteners and neoprene washers.
7. Surface Mounted Counterflashing:
   a. Minimum flashing height is 8 inches (203 mm) above finished roof height. Maximum flashing height is 24 inches (609 mm). Prime vertical wall at a rate of 100 square feet per gallon and allow to dry.
   b. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).
   c. Install base flashing ply covering wall set in bitumen with 6 inches (152 mm) on to field of the roof.
   d. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.
   e. Apply butyl tape to wall behind flashing. Secure termination bar through flashing, butyl tape and into wall. Alternatively use caulk to replace the butyl tape.
   f. Secure counterflashing set on butyl tape above flashing at 8 inches (203 mm) o.c. and caulk top of counterflashing.
8. Base Flashing For Non-Supported Deck:
   a. Inspect the nailer to assure proper attachment and configuration. The wood cant strip should be mechanically attached to the vertical and horizontal wood nailers.

b. Install compressible insulation in neoprene cradle between wall and vertical wood nailer.
c. Prime vertical wall at a rate of 100 square feet per gallon and allow to dry.
d. Install base flashing ply covering entire wall and wrapped to top of wood nailer with 6 inches (152 mm) on to field of the roof. Nail membrane at 8 inches (203 mm) o.c.
e. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.
f. Attach counterflashing through wall flashing at a spacing of 24 inches (609 mm) o.c.

9. Expansion Joint:
   a. Minimum curb height is 8 inches (203 mm) above finished roof height. Chamfer top of curb. Prime vertical curb at a rate of 100 square feet per gallon and allow to dry.
   b. Mechanically attach wood cant to expansion joint nailers. Run all field plies over cant a minimum of 2 inches (50 mm).
   c. Install compressible insulation in neoprene cradle.
   d. Install base flashing ply covering curb set in bitumen with 6 inches (152 mm) on to field of the roof.
   e. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Attach top of membrane to top of curb and nail at 8 inches (203 mm) o.c. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.
   f. Install pre-manufactured expansion joint cover. Fasten sides at 12 inches (609 mm) o.c. with fasteners and neoprene washers. Furnish all joint cover laps with butyl tape between metal covers.
10. Equipment Support:
   a. Minimum curb height is 8 inches (203 mm) above finished roof height. Prime vertical at a rate of 100 square feet per gallon and allow to dry.
   b. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).
   c. Install base flashing ply covering curb set in bitumen with 6 inches (152 mm) on to field of the roof.
   d. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Attach top of membrane to top of curb and nail at 8 inches (203 mm) o.c. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.
   e. Install pre-manufactured cover. Fasten sides at 24 inches (609 mm) o.c. with fasteners and neoprene washers. Furnish all joint cover laps with butyl tape between metal covers.
   f. Set equipment on neoprene pad and fasten as required by equipment manufacturer.
11. Skylight:
   a. Minimum curb height is 8 inches (203 mm) above finished roof height. Prime vertical at a rate of 100 square feet per gallon and allow to dry.
   b. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).
   c. Install base flashing ply covering curb set in bitumen with 6 inches (152 mm) on to field of the roof.
   d. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Attach top of membrane to top of wood nailer and apply a three-course application of mastic and mesh. Allow

to cure and aluminize.
e. Install pre-manufactured lens and fasten flashing sides at 8 inches (203 mm) o.c. with fasteners and neoprene washers.

12. Roof Drain:
    a. Plug drain to prevent debris from entering plumbing.
    b. Taper insulation to drain minimum of 24 inches (609 mm) from center of drain.
    c. Run roof system plies over drain. Cut out plies inside drain bowl.
    d. Set lead/copper flashing (30 inch square minimum) in 1/4 inch bed of mastic. Run lead/copper into drain a minimum of 2 inches (50 mm). Prime lead/copper at a rate of 100 square feet per gallon and allow to dry.
    e. Install base flashing ply (40 inch square minimum) in bitumen.
    f. Install modified membrane (48 inch square minimum) in bitumen.
    g. Install clamping ring and assure that all plies are under the clamping ring.
    h. Remove drain plug and install strainer.
13. Roof Drain Alternate:
    a. Plug drain to prevent debris from entering plumbing.
    b. Taper insulation to drain minimum of 24 inches (609 mm) from center of drain.
    c. Install two base flashing plies (40 inch square minimum) in bitumen.
    d. Set lead/copper flashing (30 inch square minimum) in 1/4 inch (6 mm) bed of mastic. Run lead/copper into drain a minimum of 2 inches (50 mm). Prime lead/copper at a rate of 100 square feet per gallon and allow to dry.
    e. Run roof system plies over drain. Cut out plies inside drain bowl.
    f. Install modified membrane (48 inch square minimum) in bitumen.
    g. Install clamping ring and assure that all plies are under the clamping ring.
    h. Remove drain plug and install strainer.
14. Plumbing Stack:
    a. Minimum stack height is 12 inches (609 mm).
    b. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric sealant.
    c. Prime flange of new sleeve. Install properly sized sleeves set in 1/4 inch (6 mm) bed of roof cement.
    d. Install base flashing ply in bitumen.
    e. Install membrane in bitumen.
    f. Caulk the intersection of the membrane with elastomeric sealant.
    g. Turn sleeve a minimum of 1 inch (25 mm) down inside of stack.
15. Heat Stack:
    a. Minimum stack height is 12 inches (609 mm).
    b. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric sealant.
    c. Prime flange of new sleeve. Install properly sized sleeves set in 1/4 inch (6 mm) bed of roof cement.
    d. Install base flashing ply in bitumen.
    e. Install modified membrane in bitumen.
    f. Caulk the intersection of the membrane with elastomeric sealant.
    g. Install new collar over cape. Weld collar or install stainless steel draw brand.
16. Pitch Pocket:
    a. Run all plies up to the penetration.
    b. Place the pitch pocket over the penetration and prime all flanges.
    c. Strip in flange of pitch pocket with one ply of base flashing ply. Extend 6 inches (152 mm) onto field of roof.
    d. Install second layer of modified membrane extending 9 inches (228 mm) onto field of the roof.
    e. Fill pitch pocket half full with non-shrink grout. Let this cure and top off with pourable sealant.

f. Caulk joint between roof system and pitch pocket with roof cement.

D. Liquid Flashing:
1. Mask target area on roof membrane with tape.
2. Clean all non-porous areas with isopropyl alcohol.
3. Apply 32 wet mil base coat of liquid flashing over masked area.
4. Embed polyester reinforcement fabric into the base coat of the liquid flashing.
5. Apply 32 wet mil top coat of the liquid flashing material over the fabric extending 2 inches (51 mm) past the scrim in all directions.

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

3.7 FIELD QUALITY CONTROL

A. Require attendance of roofing materials manufacturers' representatives at site during installation of the roofing system.

B. Perform field inspection and [and testing] as required under provisions of Section 01 41 26 - Permit Requirements.

C. Correct defects or irregularities discovered during field inspection.

3.8 FINAL INSPECTION

A. At completion of roofing installation and associated work, meet with Contractor, Architect, installer, installer of associated work, 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. If core cuts verify the presence of damp or wet materials, the installer shall be required to replace the damaged areas at his own expense.

D. 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.

E. Notify Architect upon completion of corrections.

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

3.9 SCHEDULES

A. Primers:
1. Garla-Block Primer: copolymer sealant that prevent staining and degradation of surface coatings when installed over smooth or granulated asphalt, coal tar modified bitumen, or smooth asphalt BUR membranes.
a. Non-Volatile Solids % by Weight, ASTM 3960: 28-32 %
b. Non-Volatile Solids % by Volume, ASTM 3960: 25-28 %
c. pH: 8-10
d. Wet Film Thickness @ 1 gal./100 sq. ft.: 16 mils (microns 406.4)
e. Flash Point PMCC: None
f. Drying Time, Touch @ 70 degrees F (21.1 degrees C) /50% R.H.: 1-2 hrs.
g. Viscosity @ 77 degrees F (25 degrees C) Brookfield RVT, #4 Spindle; 20 rpm, ASTM 2196: 3000-5000 cPs
h. VOC: 30 g/l max

B. Base:
1. Base Coating: LiquiTec Base: Multi-purpose, 100% solids, two-part, fast-cure, polyurea liquid waterproofing membrane having the following characteristics:
a. Elongation, ASTM D 412: 800%
b. Tensile Strength, ASTM D 412: 2500 psi
c. Tear Resistance, ASTM D 624: 449 lbs./in
d. Low Temperature Flexibility, ASTM D 522: -60 degrees F (-51.1 degrees C)
e. Hardness, ASTM D 2240 (Shore A): 80
f. Dynamic Impact Resistance (Fully Reinforced System): ASTM D 5635, 37 joules
g. Static Puncture Resistance (Fully Reinforced System): ASTM D 5602, 20 kg
h. Tensile-Tear Resistance (Fully Reinforced System): ASTM D 4073, 274 lbf
i. Tensile Load Strain (Fully Reinforced System): ASTM D 4073, 193 lbf/in.
j. Toughness: (Fully Reinforced System): 46 in.-lbf/in²
k. Dry Film Thickness (Fully Reinforced System), 90-100 mils
l. Lap Shear Strength (MB Seam with coating): ASTM D 7379, 231 lbf/in.
m. Density @ 77 degrees F (25 degrees C, ASTM D 2939) 9.6 lb./gal (1.2 g/m3)
n. Flash Point: ASTM D 93, 110 degrees F min. (43 degrees C)
o. VOC: 0 g/l
p. Microbial Resistance: ASTM G21, No Microbial Growth
q. Water Leakage Resistance: ASTM D7281, Pass

C. 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.

D. Coatings:
1. Coating: LiquiTec: Multi-purpose, 100% solids, two-part, fast-cure, polyurea liquid waterproofing membrane having the following characteristics:
a. Elongation, ASTM D 412: 800%
b. Tensile Strength, ASTM D 412: 2500 psi
c. Tear Resistance, ASTM D 624: 449 lbs./in
d. Low Temperature Flexibility, ASTM D 522: -60 degrees F (-51.1 degrees C)
e. Hardness, ASTM D2240 (Shore A): 80
f. Dynamic Impact Resistance (Fully Reinforced System): ASTM D 5635, 37 joules
g. Static Puncture Resistance (Fully Reinforced System): ASTM D 5147, 135 lb/in
h. Tensile-Tear Resistance (Fully Reinforced System): ASTM D 4073, 274 lbf
i. Tensile Load Strain (Fully Reinforced System): ASTM D 4073,193 lbf/in.
j. Toughness: (Fully Reinforced System): ASTM D 5147 46 in.-lbf/in²
k. Dry Film Thickness (Fully Reinforced System), 90-100 mils
l. Lap Shear Strength (MB Seam with coating): ASTM D 7379, 231 lbf/in.
m. Density @ 77 degrees F (25 degrees C), ASTM D 2939) 9.6 lb./gal (1.2 g/m3)
n. VOC: 0 g/l
o. Microbial Resistance: ASTM G21, No Microbial Growth
p. Water Leakage Resistance: ASTM D7281, Pass
q. Initial Reflectance: 0.84
r. Initial Emittance: 0.88
s. Initial SRI: 105

E. Liquid Flashings
1. Coating: LiquiTec: Multi-purpose, 100% solids, two-part, fast-cure, polyurea liquid waterproofing membrane having the following characteristics:
a. Elongation, ASTM D 412: 800%
b. Tensile Strength, ASTM D 412: 2500 psi
c. Tear Resistance, ASTM D 624: 449 lbs./in
d. Low Temperature Flexibility, ASTM D 522: -60 degrees F (-51.1 degrees C)
e. Hardness, ASTM D 2240 (Shore A): 80
f. Dynamic Impact Resistance (Reinforced System): ASTM D 5635, 37 joules
g. Static Puncture Resistance (Reinforced System): ASTM D 5602, 20 kg
h. Tensile-Tear Resistance (Fully Reinforced System): ASTM D 4073, 274 lbf.
i. Tensile Load Strain (Fully Reinforced System): ASTM D 4073, 135 lbf.in.
j. Toughness: ASTM D 5147 46 in.-lbf/in².
k. Dry Film Thickness (Fully Reinforced System), 70-80 mils
l. Lap Shear Strength (MB Seam with coating): ASTM D7379,
m. 231 lbf/in.
n. Density @ 77 degrees F (25 degrees C, ASTM D 2939) 9.6 lb./gal (1.2 g/m3)
o. VOC: 0 g/l
p. Microbial Resistance: ASTM G 21, No Microbial Growth
q. Water Leakage Resistance: ASTM D7281, Pass
r. Initial Reflectance: 0.84
s. Initial Emittance: 0.88
t. Initial SRI: 105
2. Coating: LiquiTec Base:
a. Elongation, ASTM D 412: 800%
b. Tensile Strength, ASTM D 412: 2500 psi
c. Tear Resistance, ASTM D 624: 449 lbs./in
d. Low Temperature Flexibility, ASTM D522: -60 degrees F (-51.1 degrees C)
e. Hardness, ASTM D2240 (Shore A): 80
f. Dynamic Impact Resistance (Fully Reinforced System): ASTM D 5635, 37

joules

g. Static Puncture Resistance (Fully Reinforced System): ASTM D 5602, 20 kg
h. Tensile-Tear Resistance (Fully Reinforced System): ASTM D 4073,
i. Tensile Load Strain (Fully Reinforced System): ASTM D 4073,
j. Toughness: ASTM D 5147 , 46 in.-lbf/in²
k. Dry Film Thickness (Fully Reinforced System), 70-80 mils
l. Lap Shear Strength (MB Seam with coating): ASTM D 7379, 231 lbf/in.
m. Density @ 77 degrees F (25 degrees C). ASTM D 2939 9.6 lb./gal (1.2 g/m3)
n. VOC: 0 g/l
o. Microbial Resistance: ASTM G 21, No Microbial Growth
p. Water Leakage Resistance: ASTM D7281, Pass

END OF SECTION

SECTION 07563

FLUID APPLIED LIQUID MEMBRANE ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Torch Applied Asphalt Roofing

B. Fluid Applied Liquid Membrane Roofing

1.2 REFERENCES

A. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Damp proofing, and Waterproofing.

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

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

D. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants.

E. ASTM C 1250 - Standard Test Method for Nonvolatile Content of Cold Liquid-Applied Elastomeric Waterproofing Membranes.

F. ASTM D 5 - Standard Test Method for Penetration of Bituminous Materials.

G. ASTM D 36 - Standard Test Method for Softening Point of Bitumen.

H. ASTM D 92 - Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester.

I. ASTM D 93 - Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester.

J. ASTM D 113 - Standard Test Method for Ductility of Bituminous Materials.

K. ASTM D 570 – Standard Test Method for Water Absorption of Plastics

L. ASTM D 816 - Standard Test Methods for Rubber Cements.

M. ASTM D 1370 - Standard Test Method for Contact Compatibility Between Asphaltic Materials (Oliensis Test).

N. ASTM D 1475 - Standard Test Method For Density of Liquid Coatings, Inks, and Related Products.

O. ASTM D 2042 - Standard Test Method for Solubility of Asphalt Materials in Trichloroethylene.

P. ASTM D 2196 - Standard Test Methods for Rheological Properties of Non-Newtonian Materials by Rotational (Brookfield type) Viscometer.

Q. ASTM D 2240 - Standard Test Method for Rubber Property-Durometer Hardness.

R. ASTM D 2369 - Standard Test Method for Volatile Content of Coatings.

S. ASTM D 3111 - Standard Test Method for Flexibility Determination of Hot-Melt Adhesives by Mandrel Bend Test Method.

T. ASTM D 3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.

U. ASTM D 4073 – Standard Test Method for Tensile-Tear Strength of Bituminous Roofing Membranes

V. ASTM D 4212 - Standard Test Method for Viscosity by Dip-Type Viscosity Cups.

W. ASTM D 4402 - Standard Test Method for Viscosity Determination of Asphalt at Elevated Temperatures Using a Rotational Viscometer.

X. ASTM D 5420 - Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact).

Y. ASTM D 5602 – Standard Test Method for Static Puncture Resistance of Roofing Membrane Specimens

Z. ASTM D 5635 – Standard Test Method for Dynamic Puncture Resistance of Roofing Membrane Specimens

AA. ASTM E 1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces

BB. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

CC. SMACNA Architectural Sheet Metal Manual.

1.3 SYSTEM DESCRIPTION

A. SBS Torch Applied Base Sheet Installation:
   1. Surface preparation: Remove dirt, and debris
   2. Edge metal installation

B. Fluid Applied Liquid Membrane:
   1. Surface preparation: Remove dirt, and debris.
   2. Primer: Prime over new asphaltic materials.

C. Install Base Coat and fabric reinforcement on flashings and entire roof surface. Let cure, and top coat flashings and entire roof surface.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

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

1.5 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 methods.

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

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

F. 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.

1.6 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 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.

1.7 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.

1.8 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. 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.

1.9 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.

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

1.10 WARRANTY

A. Warranty Period:
   a. (30) years from date of completion:

A. Installer is to guarantee all work against defects in materials and workmanship for a period indicated following final acceptance of the Work.
   a. Warranty Period:
      1) 2 years from date of acceptance.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Product: The roof system specified in this section is based upon the Garland Company, Inc. Subject to compliance with requirements.

2.2 FLUID APPLIED LIQUID MEMBRANE

A. LiquiTec System:
   1. Ultra-Shield Torch Base
   2. Coating: LiquiTec Base & LiquiTec Top
   3. Flashing:
      a. Ultra-Shield Torch Base
      b. Coating: LiquiTec Base & LiquiTec Top
   4. Reinforcement: Grip Polyester Soft

2.3 EDGE TREATMENT AND ROOF PENETRATION FLASHINGS

A. Vents and Breathers: Heavy gauge aluminum and fully insulated vent that allows moisture and air to escape but not enter the roof system as recommended and furnished by the membrane manufacturer.

B. Pitch pans, Rain Collar 24 gauge stainless or 20oz (567gram) copper. All joints should be welded/soldered watertight. See details for design.

C. Drain Flashings should be 4lb (1.8kg) sheet lead formed and rolled.

D. Plumbing stacks should be 4lb (1.8kg) sheet lead formed and rolled.

E. Liquid Flashing - Coating: LiquiTec: Multi-purpose, 100% solids, two-part, fast-cure, polyurea

F. Fabricated Flashings: Fabricated flashings and trim are specified in Section 07620.
   1. Fabricated flashings and trim shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the CDA Copper Development Association "Copper in Architecture - Handbook" as applicable.

G. Manufactured Roof Specialties: Manufactured copings, fascia, gravel stops, control joints, expansion joints, joint covers and related flashings and trim are specified in Section 07710.
   1. Manufactured roof specialties shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the NRCA "Roofing and Waterproofing Manual" as applicable.

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

A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

B. Remove all loose dirt and foreign debris from the roof surface. Do not damage roof membrane in cleaning process.

3.3 INSTALLATION

A. General Installation Requirements:
   1. 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.
   2. 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:
      a. 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.

b. 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.

3. 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
4. Install in accordance with manufacturer's instructions. Apply to minimum coating thickness required by the manufacturer.
5. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing the roof system.
6. Insurance/Code Compliance: Where required by code, install and test the roofing system to comply with governing regulation and specified insurance requirements.
7. 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.
8. All primers must be top coated within 24 hours of application. Re-prime if more time passes after priming.
9. Keep roofing materials dry during application.
10. Coordinate counter flashing, cap flashings, expansion joints and similar work with work specified in other Sections under Related Work.
11. 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. 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.

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: 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. Fluid Applied Liquid Membrane:
   1. Surface preparation: Remove dirt, and debris.
   2. Primer: Prime new asphaltic materials only at a rate of 0.5 gallons per 100 SF.
   3. Coating Mixing Procedure:
      a. Mix Part A liquid for one minute using an electric heavy duty power drill and Jiffy mixer blade.
      b. Slowly pour contents of Part B jug, located inside the Part A pail, into the Part A container and mix the two components together for two minutes moving the Jiffy blade from top to bottom and along the sides to ensure the product is thoroughly mixed.
         Always mix entire kit contents together as packaged. Do not break down into smaller quantities.
   4. Application of LiquiTec Base and Reinforcement:
      a. (Optional): Apply a bead of Green Lock XL Sealant or Tuff-Stuff MS into all MB side and end laps to reduce the height of the overlap helping to eliminate voids and tenting under fabric reinforcement
      b. On field surfaces run fabric reinforcement parallel to the low edge using a shingling method up the slope with minimum 3 inch fabric laps.
      c. After positioning reinforcement to roll out, apply coating about 40 inches wide to surface where reinforcement ply is to be applied at a rate of 3.0 gallons per 100

SF over smooth modified bitumen or 4.0 gallons per 100 SF over granule modified bitumen.

d. Use a notched squeegee to spread coating and roller apply with ¾” nap roller to obtain uniform coverage.
e. Do not apply coating too far ahead of fabric so coating does not dry before fabric can be embedded.
f. Immediately roll reinforcement into wet coating.
g. Ensure roller is fully saturated with coating and backroll over the reinforcement surface to fully saturate.
h. Use care to lay the fabric tight to the roof surface without air pockets, wrinkles, fishmouths, etc.
i. Lap adjacent rolls of reinforcement 3 inches and end laps 6 inches.
j. Allow to dry, but no more than 72 hours before applying top coat.

5. Application of Finish Coat
   a. Apply top coat at 2.0 gallon per 100 SF to clean and dry reinforced base coat application.
6. 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
   c. At the drain flashing lift strainer and clamp ring. Remove all asphalt and debris from drain bowl to ensure a clean substrate for coating application.

3.4 INSTALLATION EDGE TREATMENT AND ROOF PENETRATION FLASHING

A. Fabricated Flashings: Fabricated flashings and trim are provided as specified in Section 07620.
   1. Fabricated flashings and trim shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the Copper Development Association "Copper in Architecture - Handbook" as applicable.

B. Manufactured Roof Specialties: Manufactured copings, fascia, gravel stops, control joints, expansion joints, joint covers and related flashings and trim are provided as specified in Section 07710.
   1. Manufactured roof specialties shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the National Roofing Contractor's Association "Roofing and Waterproofing Manual" as applicable.

C. Pre-Manufactured Edge Metal: R-Mer Force Flash-less Snap-On Fascia Cover and Splice Plate.
   1. Zinc-coated steel, ASTM A653, coating designation G-90, in thickness of 24 gauge, 22 gauge or 20 gauge, 36" to 48" by coil length, chemically treated, commercial or lock-forming quality

D. Pre-Manufactured Edge Metal Finishes:
   1. Exposed and unexposed surfaces for mill finish flashing, fascia, and coping cap, as shipped from the mill
   2. Exposed surfaces for coated panels:
      a. Steel Finishes: fluorocarbon finish. Epoxy primer baked both sides, .2-.25 mils thickness as approved by finish coat manufacturer.
         Weathering finish as referred by National Coil Coaters Association (NCCA).
         Provided with the following properties.
         1) Pencil Hardness: ASTM D3363, HB-H / NCCA II-2.
         2) Bend: ASTM D-4145, O-T / NCCA II-19

3) Cross-Hatch Adhesion: ASTM D3359, no loss of adhesion
4) Gloss (60 deg. angle): ASTM D523, 25+/-5%
5) Reverse Bend: ASTM D2794, no cracking or loss of adhesion
6) Nominal Thickness: ASTM D1005
   a) Primer: 0.2 mils
   b) Topcoat, 0.7 mils min
   c) Clear Coat (optional, only used with 22 ga. steel) 0.3 mils
7) Color: Provide as specified. (Subject to minimum quantities)

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. Require attendance of roofing materials manufacturers' representatives at site during installation of the roofing system.

B. Perform field inspection and [and testing] as required under provisions of Section 01410.

C. Correct defects or irregularities discovered during field inspection.

3.8 FINAL INSPECTION

A. At completion of roofing installation and associated work, meet with Contractor, Architect, installer, installer of associated work, 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. If core cuts verify the presence of damp or wet materials, the installer shall be required to replace the damaged areas at his own expense.

D. 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.

E. Architect upon completion of corrections.

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

3.9 PROTECTION

A. Protect installed products until completion of project.

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

3.10 SCHEDULES

A. Base (Ply) Sheet:
   1. Ultra-Shield TorchBase: 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 36.7 kN/m XD 36.7 kN/m
      b. Tear Strength, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 250 lbf XD 250 lbf
         2) 50 mm/min. @ 23 +/- 2 deg. C MD 1112N XD 1112N
      c. Elongation at Maximum Tensile, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 4.0% XD 4.0%
         2) 50 mm/min. @ 23 +/- 2 deg. C MD 4.0% XD 4.0%

B. Coatings:
   1. Base Coating: LiquiTec Base: Multi-purpose, 100% solids, two-part, fast-cure, polyurea liquid waterproofing membrane having the following characteristics:
      a. Elongation, ASTM D 412: 433%
      b. Tensile Strength, ASTM D 412: 2300 psi
      c. Tear Resistance, ASTM D 624: 449 lbs./in
      d. Low Temperature Flexibility, ASTM D522: -60°F (-51.1°C)
      e. Hardness, ASTM D2240 (Shore A): 80
      f. Dynamic Impact Resistance (Fully Reinforced System): ASTM D5635, 37 joules
      g. Static Puncture Resistance (Fully Reinforced System): ASTM D5602, 20 kg
      h. Tensile-Tear Resistance (Fully Reinforced System): ASTM D4073,
      i. Tensile Load Strain (Fully Reinforced System): ASTM D4073,
      j. Toughness: 140 lb-in.
      k. Dry Film Thickness (Fully Reinforced System), 80-88 mils
      l. Lap Shear Strength (MB Seam with coating): ASTM D7379, 231 lbf/in.
      m. Density @ 77° F (25° C, ASTM D 2939) 9.6 lb./gal (1.2 g/m3)
      n. Flash Point: ASTM D 93, 110°F min. (43°C)
      o. VOC: 0 g/l
      p. Microbial Resistance: ASTM G21, No Microbial Growth

C. Reinforcement/Base Coat
   1. Grip Polyester Soft: Strong, elastic polyester reinforcing fabric.

D. Coating: LiquiTec: Multi-purpose, 100% solids, two-part, fast-cure, polyurea liquid waterproofing membrane having the following characteristics:
    a. Elongation, ASTM D 412: 433%
    b. Tensile Strength, ASTM D 412: 2300 psi
    c. Tear Resistance, ASTM D 624: 449 lbs./in
    d. Low Temperature Flexibility, ASTM D522: -60°F (-51.1°C)
    e. Hardness, ASTM D2240 (Shore A): 80
    f. Dynamic Impact Resistance (Fully Reinforced System): ASTM D5635, 37 joules
    g. Static Puncture Resistance (Fully Reinforced System): ASTM D5602, 20 kg
    h. Tensile-Tear Resistance (Fully Reinforced System): ASTM D4073,
    i. Tensile Load Strain (Fully Reinforced System): ASTM D4073,
    j. Toughness: 140 lb-in.
    k. Dry Film Thickness (Fully Reinforced System), 80-88 mils
    l. Lap Shear Strength (MB Seam with coating): ASTM D7379, 231 lbf/in.
    m. Density @ 77° F (25° C, ASTM D 2939) 9.6 lb./gal (1.2 g/m3)
    n. Flash Point: ASTM D 93, 110°F min. (43°C)
    o. VOC: 0 g/l
    p. Microbial Resistance: ASTM G21, No Microbial Growth
    q. Initial Reflectance: 0.84
    r. Initial Emittance: 0.88
    s. Initial SRI: 105

E. Flashings

F. Base (Ply) Sheet:
    1. Ultra-Shield Torchbase: 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 36.7 kN/m XD 36.7 kN/m
        b. Tear Strength, ASTM D 5147
            1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 250 lbf XD 250 lbf
            2) 50 mm/min. @ 23 +/- 2 deg. C MD 1112N XD 1112N
        c. Elongation at Maximum Tensile, ASTM D 5147
            1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 4.0% XD 4.0%
            2) 50 mm/min. @ 23 +/- 2 deg. C MD 4.0% XD 4.0%

G. Coating: LiquiTec Base: Multi-purpose, 100% solids, two-part, fast-cure, polyurea liquid waterproofing membrane having the following characteristics:
    a. Elongation, ASTM D 412: 433%
    b. Tensile Strength, ASTM D 412: 2300 psi
    c. Tear Resistance, ASTM D 624: 449 lbs./in
    d. Low Temperature Flexibility, ASTM D522: -60°F (-51.1°C)
    e. Hardness, ASTM D2240 (Shore A): 80
    f. Dynamic Impact Resistance (Fully Reinforced System): ASTM D5635, 37 joules
    g. Static Puncture Resistance (Fully Reinforced System): ASTM D5602, 20 kg
    h. Tensile-Tear Resistance (Fully Reinforced System): ASTM D4073,
    i. Tensile Load Strain (Fully Reinforced System): ASTM D4073,
    j. Toughness: 140 lb-in.
    k. Dry Film Thickness (Fully Reinforced System), 80-88 mils
    l. Lap Shear Strength (MB Seam with coating): ASTM D7379, 231 lbf/in.

m. Density @ 77° F (25° C, ASTM D 2939) 9.6 lb./gal (1.2 g/m3)
n. Flash Point: ASTM D 93, 110°F min. (43°C)
o. VOC: 0 g/l
p. Microbial Resistance: ASTM G21, No Microbial Growth

H. Coating: LiquiTec: Multi-purpose, 100% solids, two-part, fast-cure, polyurea liquid waterproofing membrane having the following characteristics:
a. Elongation, ASTM D 412: 433%
b. Tensile Strength, ASTM D 412: 2300 psi
c. Tear Resistance, ASTM D 624: 449 lbs./in
d. Low Temperature Flexibility, ASTM D522: -60°F (-51.1°C)
e. Hardness, ASTM D2240 (Shore A): 80
f. Dynamic Impact Resistance (Fully Reinforced System): ASTM D5635, 37 joules
g. Static Puncture Resistance (Fully Reinforced System): ASTM D5602, 20 kg
h. Tensile-Tear Resistance (Fully Reinforced System): ASTM D4073,
i. Tensile Load Strain (Fully Reinforced System): ASTM D4073,
j. Toughness: 140 lb-in.
k. Dry Film Thickness (Fully Reinforced System), 80-88 mils
l. Lap Shear Strength (MB Seam with coating): ASTM D7379, 231 lbf/in.
m. Density @ 77° F (25° C, ASTM D 2939) 9.6 lb./gal (1.2 g/m3)
n. Flash Point: ASTM D 93, 110°F min. (43°C)
o. VOC: 0 g/l
p. Microbial Resistance: ASTM G21, No Microbial Growth
q. Initial Reflectance: 0.84 (LiquiTec)
r. Initial Emittance: 0.88 (LiquiTec)
s. Initial SRI: 105 (LiquiTec)

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including the Conditions of the Contract and Division 01 Specification Sections apply to this section.

1.2 SUMMARY

A. Provide all labor, equipment, and materials to fabricate and install the following. Installation per code requirements of ANSI/SPRI ES1 building and site specific.

1. Edge strip and flashing.

2. Fascias, scuppers, and trim.

3. Coping cap at parapets.

4. Fascia and edge metal.

5. Gutters, scuppers and down spouts.

B. Related Sections:

1. Division 07 Section Common Work Results for Thermal and Moisture Protection.

C. Related Work Specified Elsewhere:

1. Division 06 Section Rough Carpentry

2. Division 07 Section Modified Bituminous Membrane Roofing

3. Division 07 Section Built Up Roofing

4. Division 07 Section Roof Accessories

5. Division 07 Section Joint Sealants

6. Division 07 Section Manufactured Metal Roof Panels

7. Division 07 Section Manufactured Metal Wall Panels.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (galvanized) or Zinc-Iron Alloy-Coated (galvannealed) by the Hot-Dip Process.

2. ASTM A792 Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy Coated by the Hot-Dip Process.

3. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

4. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

5. ASTM D692 Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures.

B. American National Standards Institute and Single Ply Roofing Institute (ANSI/SPRI)

1. ANSI/SPRI ES-1 Testing and Certification Listing of Shop Fabricated Edge Metal

C. Warnock Hersey International, Inc., Middleton, WI (WH)

D. Factory Mutual Research Corporation (FMRC)

E. Underwriters Laboratories (UL)

F. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

1. 1993 Edition Architectural Sheet Metal Manual

G. National Roofing Contractors Association (NRCA)

1. Roofing and Waterproofing Manual

H. American Society of Civil Engineers (ASCE)

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

1.4 SUBMITTALS FOR REVIEW

A. Product Data:

1. Provide manufacturer's specification data sheets for each product.

2. Metal material characteristics and installation recommendations.

3. Submit color chart prior to material ordering and/or fabrication so that equivalent colors to those specified can be approved.

B. Samples: Submit two (2) samples, illustrating typical metal edge, coping, gutters, fascia extenders for material and finish.

C. Shop Drawings

1. For manufactured and ANSI/SPRI approved shop fabricated gravel stops, fascia, scuppers, and all other sheet metal fabrications.

2. Indicate material profile, jointing pattern, jointing details, fastening methods, flashing, terminations, and installation details.

3. Indicate type, gauge and finish of metal.

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.

1.5 SUBMITTALS FOR INFORMATION

A. Design Loads: 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 wind uplift and perimeter attachment requirements according to ASCE 7-05 and ANSI/SPRI ES-1. Substitution requests submitted without licensed engineer approval will be rejected for non-conformance.

B. Factory Mutual Research Corporation's (FMRC) wind uplift resistance classification: The roof perimeter flashing shall conform to the requirements as defined by the FMRC Loss Prevention Data Sheet 1-49.

C. 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.:

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

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

F. Certifications:

1. Submit roof manufacturer's certification that metal fasteners furnished are acceptable to roof manufacturer.

2. Submit roof manufacturer's certification that metal furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.

1.6 CONTRACT CLOSEOUT SUBMITTALS

A. General: Comply with Requirements of Section 01 77 00 - Closeout Submittals.

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

C. Roofing Maintenance Instructions. Provide a manual of manufacturer's recommendations for maintenance of installed roofing systems.

D. Insurance Certification: 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.

1.7 QUALITY ASSURANCE

A. Engage an experienced roofing contractor specializing in sheet metal flashing work with a minimum of five (5) years experience.

B. Maintain a full-time supervisor/foreman who is on the job-site at all times during installation. Foreman must have a minimum of five (5) years experience with the installation of similar system to that specified.

C. Source Limitation: Obtain components from a single manufacturer. Secondary products which cannot be supplied by the specified manufacturer shall be approved in writing by the primary manufacturer prior to bidding.

D. Upon request fabricator/installer shall submit work experience and evidence of financial responsibility. The Owner's representative reserves the right to inspect fabrication facilities in determining qualifications.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened containers or packages with labels intact and legible.

B. Stack pre-formed and pre-finished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials which may cause discoloration or staining.

1.9 PROJECT CONDITIONS

A. Determine that work of other trades will not hamper or conflict with necessary fabrication and storage requirements for pre-formed metal edge system.

1.10 DESIGN AND PERFORMANCE CRITERIA

A. Thermal expansion and contraction:

1. Completed metal edge 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. Coping cap, Fascia, and Drip Edge installed per ANSI/SPRI ES1 building and site specific.

1.11 WARRANTIES

A. Owner shall receive one (1) 30 Year No Dollar Limit Leak warranty from manufacturer of roofing materials covering all of the following criteria. Multiple warranties are not acceptable.

1. Pre-finished metal material shall require a written twenty (20)-year non-prorated warranty covering fade, chalking and film integrity. The material shall not show a color change greater than 5 NBS color units per ASTM D2244 or chalking excess of 8 units per ASTM D659. If either occurs material shall be replaced per warranty, at no cost to the Owner.

2. Changes: Changes or alterations in the edge metal system without prior written consent from the manufacturer shall render the system unacceptable for a warranty.

3. Warranty shall commence on date of substantial completion or final payment, whichever is agreed by contract.

4. The Contractor shall provide the Owner with a notarized written warranty assuring that all sheet metal work including caulking and fasteners to be watertight and secure for a period of two years from the date of final acceptance of the building. Warranty shall include all materials and workmanship required to repair any leaks that develop, and make good any damage to other work or equipment caused by such leaks or the repairs thereof.

5. Installing roofing contractor shall be responsible for the installation of the edge metal system in general accordance with the membrane manufacturer's recommendations.

6. Installing contractor shall certify that the edge metal system has been installed per the manufacturer's printed details and specifications.

7. One manufacturer shall provide a 30 Year No Dollar Limit Leak Warranty as a single warranty for all accessory metal for flashings, metal edges and copings, along with the warranty for metal roof areas, membrane roof areas, and any transitions between two different material types.

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 herein 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.

C. Substitutions: Products proposed as equal to the products specified in this Section shall be submitted in accordance with Bidding Requirements and Division 01 provisions.

1. Proposals shall be accompanied by a copy of the manufacturer's standard specification section. That specification section shall be signed and sealed by a professional engineer licensed in the state in which the installation is to take place. Substitution requests containing specifications without licensed engineer certification shall be rejected for non-conformance.

2. Include a list of three (3) projects of similar type and extent, located within a one hundred mile radius from the location of the project. In addition, the three projects must be at least five (5) years old and be available for inspection by the Architect, Owner or Owner's Representative.

3. Equivalency of performance criteria, warranty terms, submittal procedures, and contractual terms will constitute the basis of acceptance.

4. The Owner's decision regarding substitutions will be considered final. Unauthorized substitutions will be rejected.

2.2 ACCEPTABLE MANUFACTURERS

A. The design is based upon roofing systems engineered and manufactured by the Garland Company:

The Garland Company
Sean Magee
Telephone: 310 420 0713

2.3 MATERIALS

A. General: Product designations for the materials used in this section shall be based on performance characteristics of the R-MER Edge System manufactured by the Garland Company, Cleveland, OH, and shall form the basis of the contract documents.

B. Materials:

1. Minimum gauge of steel or thickness of Aluminum to be specified in accordance with Architectural Sheet Metal Manual, Sheet Metal and Air Conditioning Contractor's National Association, Inc. recommendations.

2. Unexposed base metal material:

R-Mer Edge Fascia or Extruded Fascia Continuous Cant

a. Zinc-coated steel, ASTM A653, coating designation G-90, in thickness of 0.0299 nom./ 22 gauge, 36" to 48" by coil length, chemically treated, commercial or lock-forming quality.

R-Mer Edge Coping Chairs

a. Zinc-coated steel, ASTM A653, coating designation G-90, in thickness of 0.0635 nom./ 16 gauge, 36" to 48" by coil length, chemically treated, commercial or lock-forming quality.

3. Exposed base metal material:

R-Mer Edge Fascia/drip edge

a. Zinc-coated steel, ASTM A653, coating designation G-90, in thickness of 22 gauge, 36" to 48" by coil length, chemically treated, commercial or lock-forming quality.

R-Mer Edge Coping

a. Zinc-coated steel, ASTM A653, coating designation G-90, in thickness of 24 gauge 36" to 48" by coil length, chemically treated, commercial or lock-forming quality.

C. Finishes:

1. Exposed surfaces for coated edge metal:

a. Steel Finishes: fluorocarbon finish. Epoxy primer baked both sides, .2-.25 mils thickness as approved by finish coat manufacturer.

Weathering finish as referred by National Coil Coaters Association (NCCA).

PROPERTY	TEST METHOD	FLUOROCARBON*
Pencil Hardness	ASTM D3363 NCCA II-2	HB-H
Bend	ASTM D-4145 NCCA II-19	O-T
Cross-Hatch Adhesion	ASTM D3359	no loss of adhesion
Gloss (60° angle)	ASTM D523	25+/-5%
Reverse Impact	ASTM D2794	no cracking or loss of adhesion
Nominal Thickness	ASTM D1005	
Primer		0.2 mils
Topcoat		0.8 mils
TOTAL		1.0 mils

* Subject to minimum quantity requirements

b. Color shall be as specified

2. Exposed and unexposed surfaces for mill finish flashing, fascia, and coping cap, shall be as shipped from the mill.

3. Exposed and unexposed surfaces for anodized aluminum flashing, fascia, and coping cap, shall be as shipped from mill.

2.4 RELATED MATERIALS AND ACCESSORIES

A. Metal Primer: Zinc chromate type.

B. Plastic Cement: ASTM D 4586

C. Sealant: Specified in Section 07900 or on drawings.

D. Underlayment: ASTM D2178, No15 asphalt saturated roofing felt.

E. Slip Sheet: Rosin sized building paper.

F. Fasteners:

1. Corrosion resistant screw fastener as recommended by metal manufacturer. Finish exposed fasteners same as flashing metal.

2. Fastening shall conform to Factory Mutual requirements or as stated on section details, whichever is more stringent.

G. Gutter and Downspout Anchorage Devices: Material as specified for system.

PART 3 — EXECUTION

3.1 EXECUTION, GENERAL

A. Refer to Division 07 Section Common Work Results for Thermal and Moisture Protection.

3.2 PROTECTION

A. Isolate metal products from dissimilar metals, masonry or concrete with bituminous paint, tape, or slip sheet. Use gasketed fasteners where required to prevent corrosive reactions.

3.3 GENERAL

A. Secure fascia to wood nailers at the bottom edge with a continuous cleat.

B. Fastening of metal to walls and wood blocking shall comply with building code standards.

C. All accessories or other items essential to the completeness of sheet metal installation, whether specifically indicated or not, shall be provided and of the same material as item to which applied.

D. Allow sufficient clearances for expansion and contraction of linear metal components. Secure metal using fasteners as required by the system. Exposed face fastening will be rejected.

3.4 INSPECTION

A. Verify that curbs are solidly set and nailing strips located.

B. Perform field measurements prior to fabrication.

C. Coordinate work with work of other trades.

D. Verify that substrate is dry, clean and free of foreign matter.

E. Commencement of installation shall be considered acceptance of existing conditions.

3.5 MANUFACTURED SHEET METAL SYSTEMS

A. Furnish and install manufactured fascia and coping cap systems in strict accordance with manufacturer's printed instructions.

B. Provide factory-fabricated accessories including, but not limited to, fascia extenders, miters, scuppers, joint covers, etc. Refer to Source limitation provision in Part 1.

3.6 SHOP-FABRICATED SHEET METAL

A. Metal work shall be shop fabricated to configurations and forms in accordance with recognized sheet metal practices.

B. Hem exposed edges.

C. Angle bottom edges of exposed vertical surfaces to form drip.

D. Lap corners with adjoining pieces fastened and set in sealant.

E. Form joints for gravel stop fascia system, coping cap with a 3/8" opening between sections. Back the opening with an internal drainage plate formed to the profile of fascia piece.

F. Install sheet metal to comply with referenced ANSI/SPRI, SMACNA and NRCA standards.

3.7 FLASHING MEMBRANE INSTALLATION

A. Scupper Through Roof Edge

1. Install scupper box in a one fourth (1/4) inch bed of mastic. Assure all box seams are soldered and have minimum four (4) inch flange. Make sure all corners are closed and soldered.

2. Prime metal edge at a rate of one hundred (100) square feet per gallon and allow to dry.

B. Snap-On Fascia Detail

1. Install per ANSI/SPRI ES1 building and site specific.

2. Position base plies of the Built-Up and/or Modified Roofing membrane over the roof edge covering nailers completely, fastening eight (8) inches on center. Install membrane and cap sheet with proper material and procedure according to manufacturer's recommendations.

3. Install scupper boxes and miters first.

4. Cant Dam: Install Cant Dam with roofing nails twelve (12) inches on center through the top of metal flange and outside face.

5. BUR or Modified Flashing: Prime Cant Dam at a rate of one hundred (100) square feet per gallon and allow to dry. Strip in Cant Dam with base flashing membrane extending six (6) inches into roof field, followed with a cap sheet extending nine (9) inches into the roof field. Install membrane and cap sheet with proper material and procedure according to manufacturer's recommendations.

6. Fascia Cover: Install fascia cover with splice plate under one end by pressing downward firmly until "snap" occurs and cover is engaged along entire length of miter. Field cut where

necessary with fine tooth saw. Sealant is to be placed between six (6) inch wide splice plates on metal edge pieces, one bead, approximately one (1) inch from fascia cover joint.

C. Extruded Fascia Detail

1. Install per ANSI/SPRI ES1 building and site specific.

2. Position base plies of the Built-Up and/or Modified Roofing membrane over the roof edge covering nailers completely, fastening eight (8) inches on center. Install membrane and cap sheet with proper material and procedure according to manufacturer's recommendations.

3. Install scupper boxes and miters first.

4. Cant Dam: Install Cant Dam with roofing nails twelve (12) inches on center through the top of metal flange and outside face.

5. BUR or Modified Flashing: Prime Cant Dam at a rate of one hundred (100) square feet per gallon and allow to dry. Strip in Cant Dam with base flashing membrane extending six (6) inches into roof field, followed with a cap sheet extending nine (9) inches into the roof field. Install membrane and cap sheet with proper material and procedure according to manufacturer's recommendations.

6. Place flashing piece into position for installation of the fascia.

7. Fascia Cover: Insert splice plate at one end of the fascia and engage fascia with flashing piece. Sealant is to be placed between splice plates on metal edge pieces, one bead, approximately one (1) inch from fascia cover joint. Install flashing screws into pre-punched holes in fascia, compressing the flashing.

D. Drip Edge Detail

1. Install per ANSI/SPRI ES1 building and site specific.

2. Position base plies of the Built-Up and/or Modified Roofing membrane over the roof edge covering nailers completely, fastening eight (8) inches on center. Install membrane and cap sheet with proper material and procedure according to manufacturer's recommendations.

3. Install continuous cleat on face of nailer and fasten six (6) inches on center per ANSI/SPRI ES1 building and site specific.

4. Install new Drip Edge hooked to continuous cleat. Set metal flange into roofing cement, nail every three (3) inches on center, and prime at a rate of one hundred (100) square feet per gallon.

5. Drip Edge flange with base flashing membrane extending six (6) inches into roof field, followed with a cap sheet extending nine (9) inches into the roof field. Install membrane and cap sheet with proper material and procedure according to manufacturer's recommendations.

E. Gravel Stop Detail

1. Install per ANSI/SPRI ES1 building and site specific.

2. Position base plies of the Built-Up and/or Modified Roofing membrane over the roof edge covering nailers completely, fastening eight (8) inches on center. Install membrane and cap sheet with proper material and procedure according to manufacturer's recommendations.

3. Install continuous cleat on face of nailer and fasten six (6) inches on center.

4. Install new Gravel Stop hooked to continuous cleat. Set metal flange into roofing cement, nail every three (3) inches on center, and prime at a rate of one hundred (100) square feet per gallon.

5. Strip in Gravel Stop flange with base flashing membrane extending six (6) inches into roof field, followed with a cap sheet extending nine (9) inches into the roof field. Install membrane and cap sheet with proper material and procedure according to manufacturer's recommendations.

F. Edge Metal With Gutter

1. Position base plies of the Built-Up and/or Modified Roofing membrane over the roof edge covering nailers completely, fastening eight (8) inches on center. Install membrane and cap sheet with proper material and procedure according to manufacturer's recommendations.

2. Install gutter and strapping fastening six (6) inches on center.

3. Install continuous cleat on face of nailer and fasten six (6) inches on center.

4. Install new edge metal hooked to continuous cleat. Set metal flange into roofing cement, nail every three (3) inches on center, and prime at a rate of one hundred (100) square feet per gallon.

5. Strip in edge metal with base flashing membrane extending six (6) inches into roof field, followed with a cap sheet extending nine (9) inches into the roof field. Install membrane and cap sheet with proper material and procedure according to manufacturer's recommendations.

G. Snap-On Coping Cap Detail

1. Install per ANSI/SPRI ES1 building and site specific.

2. Install Miters first.

3. Position base flashing of the Built-Up and/or Modified Roofing membrane over the wall edge covering nailers completely, fastening eight (8) inches on center. Install membrane and cap sheet with proper material and procedure according to manufacturer's recommendations.

4. Install minimum sixteen (16) gauge, sixteen (16) inch long by specified width anchor chair per ANSI/SPRI ES1, maximum 5’ feet on center.

5. Install six (6) inch wide splice plate by centering over sixteen (16) inch long by specified width anchor chair. Apply two beads of sealant to either side of the splice plate's center. Approximately two (2) inches from the coping cap joint. Install Coping Cap by hooking outside hem of coping on outside face of anchor chair. Press downward on inside edge of coping until "snap" occurs and hem is engaged on the entire chair.

3.8 CLEANING

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

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

3.9 CONSTRUCTION WASTE MANAGEMENT

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

3.10 FINAL INSPECTION

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

B. Inspect work and flashing of roof 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 Contractor, Architect, Owner upon completion of corrections.

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

F. Immediately correct roof 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.

3.11 DEMONSTRATION AND TRAINING

A. At a time and date agreed to by the Owner, instruct the Owner's facility manager, or other representative designated by the Owner, on the following procedures:

1. Troubleshooting procedures.

2. Notification procedures for reporting leaks or other apparent roofing problems.

3. Maintenance.

4. The Owner's obligations for maintaining the warranty in effect and force.

5. The Manufacturer's obligations for maintaining the warranty in effect and force.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Sealants and sealing enclosure components of the structure, exterior intersections of dissimilar materials, interior voids at intersections of dissimilar materials and perimeters of plumbing fixtures. Joints left open by requirements of other sections shall be closed as a part of this section.

1.02 RELATED SECTIONS:

1. Division 07: Flashing and Sheet Metal

2. Division 08: Hollow Metal Doors and Frames.

3. Division 09: Painting.

4. Division 06: Finish Carpentry.

1.03 QUALITY ASSURANCE

A. Certification of Sealant Materials: With each delivery of materials, the manufacturer shall certify, in writing, that the materials comply with specification requirements.

B. This work shall be applied by qualified, experienced applicators in strict accordance with manufacturer's printed directions. Applicator shall have completed at least 3 joint sealer applications of similar type and size in the last 5 years.

C. Each sealant and caulking type used shall be the products of a single manufacturer and meet or exceed the requirements of American National Standards Institute for polyurethane and polysulfide compounds.

1.04 SUBMITTALS

A. All submittals shall be made in accordance with Division 01.

B. Submit manufacturer's data, manufacturer's printed preparation and application instructions and schedule of sealants and caulking compounds to be used.

C. Samples: Submit standard range of color samples of exposed sealants to be used.

D. Sample Joint: When so directed, prepare a sample joint for Architect's approval, for each type of caulked or sealed joint indicated. The approved sample joint will be used as the standard of quality for the workmanship required.

1.05 PRODUCT HANDLING

A. Caulking compounds and sealants shall be delivered to the project in unopened factory labeled containers with labels intact. Each label shall contain a statement of conformance to standards specified for each material.

B. Each product shall be shipped with corresponding MSDS sheets and these shall be added to the on-site file in the construction offices.

1.06 SITE CONDITIONS

A. Prior to any installation of this work, all surfaces to receive such work shall be in proper condition and location. All unsatisfactory conditions shall be reported to the District Inspector. The work shall not proceed until all such conditions have been corrected.

1.07 GUARANTEE

A. Materials and workmanship shall be guaranteed in accordance with the requirements of the general conditions, except that the guarantee shall cover the maintenance of all work in a watertight condition for a period of two (2) years from the date of acceptance by the Owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Materials shall be the product of one of the following manufacturers or approved equal:

1. Sika Corp., Lynhurst, NJ

2. Sonneborn Building Products, Minneapolis, MN

3. Tremco, Beachwood, OH

4. 3M Products, St. Paul, MN

2.02 MATERIALS

A. Caulking Compound: ASTM C 834 Latex Caulk, for interior use only.

B. Sealant: Either 1 part or 2 part sealant at Contractor's option to meet the following requirements:

1. 1 Part Sealant: Fed. Spec. TT-S-00230C(2), "Sealing Compound: Elastomeric Type, Single Component (for Caulking, Sealing, and Glazing in Buildings and Other Structures)".

2. 2 Part Sealant: Fed. Spec. TT-S-00227E(3), "Sealing Compound, Elastomeric Type, Two Component (for Caulking, Sealing, and Glazing in Buildings and Other Structures)".

C. Penetrations through fire barriers:

1. 3M Brand Fire Barrier Caulk CP-25.

2. 3M Brand Fire Barrier Putty 303.

D. Joint Backing Material: Material used must be approved by manufacturer of sealant as being chemically compatible with primer and sealant and shall be:

1. Rod Backing: Approved polyethylene, vinyl, foam rod, medium to firm density type recommended by sealant manufacturer. Backing shall not contain oil, butyl, asphalt loading, or neoprene.

2. Bond Breaker: Polyethylene tape.

E. Lacquer Sealer: Clear vinyl recommended by caulking compound manufacturer.

F. Primers: Non-staining type. As manufactured and recommended by the manufacturer of the sealant used.

G. Sealants shall have normal curing schedules, shall be non-staining, color fast and shall resist deterioration due to ultra-violet radiation.

PART 3 - EXECUTION

3.01 PREPARATION

A. Protection: Adjacent surfaces and materials which might become damaged or stained due to the work of this section shall be adequately protected. Provide masking tape on both sides of joints where surfaces are subject to staining and remove tape when joint is completed.

B. Surface preparation: Apply sealant and caulking materials to clean, dry surfaces free from grease, oil, wax or other foreign matter. Clean and prime in accordance with sealant or compound manufacturer's instructions and recommendations.

3.02 APPLICATION

A. Joints in exterior surfaces to be sealed with sealant only. Unless otherwise specified, interior joints may be sealed with sealant or conventional caulking compound, at the Contractor's option.

B. Partially fill joints with joint backing material, using only compatible materials, until joint depth does not exceed 1/2" or the joint width where less than 1/2". Minimum joint width for metal to metal joints shall be 1/4". Joint depth, shall be not less than 1/4" and not greater than 1/2".

C. Apply sealant under sufficient pressure to completely fill voids. Finish exposed joints smooth, flush with surfaces or recessed as shown. Apply non-tracking sealant to concrete expansion joints subject to foot or vehicular traffic loading.

D. Where joint depth prevents the use of standard bond breaker backing rod, use non-adhering tape covering to prevent bonding of the sealant to the back of the joint. Under no circumstances shall sealant depth exceed 1/2", unless specifically shown on Drawings.

E. Conventional Caulking: Prime porous surfaces after cleaning. Pack joints deeper than 3/4" with sponge material to within 3/4" of surface. Completely fill joints and spaces with gun applied caulking compound, forming a neat, smooth bead. Use hand tools where use of gun is impractical. Protect joints until fully set and seal with lacquer sealer where exposed or to receive paint finish.

3.03 CLEANING

A. Masking and excess materials shall be removed from other finished surfaces as soon as caulking or sealing in the area is completed. Thin films of cured compound may be removed with stripping compound; no abrasives shall be used. Whenever excess cured compounds are removed, exercise care not to damage finished surfaces.

3.04 CURING

A. Caulking and sealants shall cure in accordance with manufacturer's printed recommendations. Exercise care not to disturb the seal until completely cured. Damaged caulking and sealants shall be repaired as recommended by product manufacturer.

B. Ensure all foot and other traffic is kept off walkways and footpaths where sealer or joint compound has been applied until it has cured to 100% of its maximum strength.

END OF SECTION

SECTION 32 9200

TURF AND GRASSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Lawn restoration at all areas of removal and or all disturbed areas

1.2 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

C. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

D. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

E. Topsoil: Topsoil to be provided by contractor from off-site sources with the specified minimum quality specifications herin. Topsoil proposed for use to be processed and shall meet tested criteria results specified and conform to adjustments as recommended by the soil testing laboratory.

F. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

G. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

H. Surface Soil: Whatever soil is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.3 INFORMATIONAL SUBMITTALS

A. Source of topsoil

B. Seed Mix.

C. Qualification Data: For qualified landscape Installer.

D. QUALITY ASSURANCE

E. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

1.5 MAINTENANCE SERVICE

A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: 60 days from date of planting completion.

a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species: State-certified seed of grass species as follows:

1. Sun and Partial Shade: Proportioned by weight as follows:

a. 50 percent Kentucky B bluegrass, 2 varieties.
b. 25 percent Creeping Red Fescue
c. 25 percent Turf Type Perennial Rye

2.2 FERTILIZERS

A. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 10 percent nitrogen, 20 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.3 TOPSOILS

A. Import topsoil or manufactured topsoil from off-site or on-site sources; do not obtain from agricultural land, bogs or marshes. Verify suitability of soil to produce viable planting soil. Soil to be fertile, friable and representative of local production soil, capable of sustaining vigorous plant growth and screened free of roots, plants, sod, stones, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Remove all stones 1/2 inch and larger. On average, no more than 3 stones, 1/4 inch and larger should be visible with in a 6 inch by 6 inch area.

B. ASTM D 5268 topsoil from the top surface horizon layer.

C. Topsoil shall have a pH range of 5.5 to 7.5, adjusted to not more than 7.0 by additives as required by soils test.

D. Topsoil shall be not less than 2% and not greater than 5% native organic matter, not compost material, as determined by a loss by ignition test at 360 degrees C.

E. Topsoil to have a soil textural classification of Sandy Loam.

F. Topsoil clay content as determined by Bouyoucous Hydrometer Test shall range between 5% and 20%

G. Topsoil sand content shall be not less than 40% and not greater than 80%, as determined by a mechanical analysis.

2.4 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

2.5 PESTICIDES

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

A. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. Installation to occur prior to any earth excavation.

3.2 TURF AREA PREPARATION

A. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 12 inches. Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
   1. Spread topsoil to a depth of 6 inches (150 mm) but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if topsoil or subgrade is frozen, muddy, or excessively wet.

B. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:

   1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
   2. Loosen surface soil to a depth of at least 12 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches (100 mm) of soil. Till soil to a homogeneous mixture of fine texture.

   3. Remove stones larger than ½ inch in any dimension and sticks, roots, trash, and other extraneous matter.

4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

C. Hand Rake: Hand rake topsoil areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

D. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

E. Before planting, obtain Architect's acceptance of hand raking; restore planting areas if eroded or otherwise disturbed after finish grading.

3.3 TURF WATERING AND MAINTENANCE

A. Establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches (100 mm).

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a minimum rate of 1 inch (25 mm) per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain height appropriate for species without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings.

D. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

3.4 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm).

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

C. Watering: Install and maintain temporary piping, hoses, and meadow-watering equipment to convey water from sources and to keep meadow uniformly moist.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.

3.5 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

END OF SECTION 32 9200