

SECTION 01 10 00

SUMMARY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Contract description.
- B. Work by Owner.
- C. Contractor's use of site.
- D. Work sequence.
- E. Owner occupancy.
- F. Specification Conventions.

1.2 CONTRACT DESCRIPTION

- A. Work of the Project includes:

The complete removal of the exiting asphalt roof and appurtenances to the roof sheathing and replacement with new as indicated on the project Drawings.

The complete removal of the existing roof membrane and insulation, down to the roof sheathing, and replacement with new materials as indicated on the project Drawings.

Bid alternate work for gutters and repairs for the slate roof as indicated on the project Drawings.

- B. Regulated material: See Appendix.
- C. Work of the Contract is identified in the Bid Section of the specifications.

1.3 WORK BY OWNER

- A. The Owner will award a contract for the project commencing on the date established in the post-bid conference.

1.4 CONTRACTOR'S USE OF SITE

- A. Access to Site: Shall be instructed by the Owner.
- B. Emergency Building Exits During Construction: Shall be coordinated with the approval by the Owner.
- C. Construction Operations: Shall be instructed by the Owner.

- D. Time Restrictions for Performing Interior Work: Shall be instructed by the Owner.
- E. Utility Outages and Shutdown: Shall be coordinated with the approval by the Owner.

1.5 WORK SEQUENCE

- A. Construct Work to accommodate Owner's occupancy requirements during construction period, coordinate construction schedule and operations with the Owner/Architect.

1.6 OWNER OCCUPANCY

- A. The Owner will occupy the premises during the entire period of construction.
- B. The one-way traffic and vehicle circulation shall be maintained at all times.
- C. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.
- D. Contractor to comply with the Town noise ordinance. With the agreement by the Town, the building may be opened and or closed outside of the scheduled/posted hours.

1.7 SPECIFICATION CONVENTIONS

- A. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words “shall be” are included by inference where a colon (:) is used within sentences or phrases.

END OF SECTION

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Coordination and project conditions.
- B. Preconstruction meeting.
- C. Progress meetings.
- D. Cutting and patching.
- E. Special procedures.

1.2 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of various sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.
- C. Coordinate space requirements, supports, and installation of Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion.
- E. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.3 PRECONSTRUCTION MEETING

- A. Architect/Engineer will schedule meeting after Notice of Award.
- B. Attendance Required: Owner, Architect/Engineer, and Contractor.
- C. Agenda:
 - 1. Submission of executed bonds and insurance certificates.

2. Distribution of Contract Documents.
 3. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.
 4. Designation of personnel representing parties in Contract, Owner, and Architect/Engineer.
 5. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 6. Scheduling.
- D. Contractor shall record minutes and distribute copies within two days after meeting to participants, with copy to Architect/Engineer, Owner, and those affected by decisions made.

1.4 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum bi-monthly intervals.
- B. Attendance Required: Job superintendent, major subcontractors and suppliers, Owner, Architect/Engineer, as appropriate to agenda topics for each meeting.
- C. Contractor shall record minutes and distribute copies within two days after meeting to participants, with copy to Architect/Engineer, Owner, and those affected by decisions made.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Execute cutting, fitting, and patching to complete Work.
- C. Execute work by methods to avoid damage to other Work, and to provide proper surfaces to receive patching and finishing.
- D. Restore Work with new products in accordance with requirements of Contract Documents.
- E. Maintain integrity of construction; completely seal voids.
- F. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.

- G. Identify hazardous substances or conditions exposed during the Work to Architect/Engineer for decision or remedy.

3.2 SPECIAL PROCEDURES

- A. Materials: As specified in product sections; match existing with new products and salvaged products for patching and extending work.
- B. Employ skilled and experienced installer to perform alteration work.
- C. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.
- D. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.
- E. Remove debris and abandoned items from area and from concealed spaces.
- F. Prepare surface and remove surface finishes to permit installation of new work and finishes.
- G. Remove, cut, and patch Work in manner to minimize damage and to permit restoring products and finishes to original condition.
- H. Refinish existing visible surfaces to remain in renovated rooms and spaces, to renewed condition for each material, with neat transition to adjacent finishes.
- I. Where new Work abuts or aligns with existing, provide smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.
- J. When finished surfaces are cut so that smooth transition with new Work is not possible, terminate existing surface along straight line at natural line of division and submit recommendation to Architect/Engineer for review.
- K. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.
- L. Finish surfaces as specified in individual product sections.

END OF SECTION

SECTION 01 32 20

PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
 - 3. Final Completion construction photographs.

1.3 SUBMITTALS

- A. Qualification Data: For photographer.
- B. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate the location of construction. Include same label information as corresponding set of photographs.
- C. Construction Photographs: Submit digital copies of each photographic view within seven (7) days of taking photographs.
 - 1. Identification: Identify each photograph with the following information:
 - a. Name of Project.
 - b. Date of the photograph OR date stamped by the camera.
 - c. Description of vantage point, indicating location, direction (by compass point) of construction.
 - d. Unique sequential identifier (i.e. 1, 2, 3 etc.).
 - 2. Digital Images: Submit a complete set of digital image electronic files as a Project Record Document on CD-ROM or thumb drive. Provide (1) copy to the owner and (1) copy to the architect/engineer. Identify electronic media with date

photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.

1.4 QUALITY ASSURANCE

- A. Photographer Qualifications: An individual who has been regularly engaged as a project manager and capable of photographing construction projects for not less than three years.

1.5 COORDINATION

- A. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities, including temporary lighting required to produce clear, well-lit photographs without obscuring shadows.

1.6 USAGE RIGHTS

- A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in uncompressed .tif or .jpg format, produced by a digital camera with minimum sensor size of 18 megapixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. Photographer: Competent Project Manager to take construction photographs.
- B. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.

- C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 - 1. Date and Time: Include date and time in filename for each image.
 - 2. Field Office Images: Maintain one set of images on CD-ROM in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Architect and Owner.
- D. Preconstruction Photographs: Before commencement of demolition take color, digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
 - 1. Take photographs to show existing conditions adjacent to property before starting the Work.
 - 2. Take additional photographs as required to record the property and adjacent properties, structures, pavements, etc.
- E. Periodic Construction Photographs: Take color, digital photographs weekly. Submittal of the photographs shall coincide with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- F. Architect-Directed Construction Photographs: From time to time, Architect will instruct photographer about number and frequency of color, digital photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.
- G. Final Completion Construction Photographs: Take color photographs after date of Substantial Completion for submission as Project Record Documents. Architect will direct photographer for desired vantage points.
 - 1. Do not include date stamp.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Product data.
- D. Shop drawings.
- E. Samples.
- F. Certificates.
- G. Manufacturer's instructions.

1.2 SUBMITTAL PROCEDURES

- A. Transmit each submittal with separate transmittal identifying the product.
- B. Identify Project, Contractor, subcontractor and supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.
- C. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents.
- D. Schedule submittals to expedite Project, and deliver to Architect/Engineer. Coordinate submission of related items.
- E. For each submittal for Architect/Engineer review, allow one (1) week excluding delivery time to and from Contractor.
 - a. Emailing of .pdf files/documentation is acceptable.
- F. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.
- G. Allow space on submittals for Contractor and Architect/Engineer review stamps.
- H. When revised for resubmission, identify changes made since previous submission.

- I. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
- J. Submittals not requested will not be recognized or processed.
- K. Provide Architect with Contractor's overnight delivery account number so that Architect may return reviewed submittal by overnight service.

1.3 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit preliminary outline Schedules within (10) ten days after date of established in Notice to Proceed for coordination with Owner's requirements. After review, submit detailed schedules within (10) ten days modified to accommodate revisions recommended by Architect/Engineer and by Owner.
- B. Submit revised Progress Schedules every (2) weeks.
- C. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.
- D. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

1.4 PRODUCT DATA

- A. Product Data: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Submit number of copies Contractor requires, plus two copies Architect/Engineer will retain.
- C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- E. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.5 SHOP DRAWINGS

- A. Shop Drawings: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

- B. When required by individual specification sections, provide shop drawings signed and sealed by professional engineer responsible for designing components shown on shop drawings.
 - 1. Include signed and sealed calculations to support design.
 - 2. Submit drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
 - 3. Make revisions and provide additional information when required by authorities having jurisdiction.
- C. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.
- D. See Drawings for additional requirements.

1.6 SAMPLES

- A. Samples: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Samples For Selection as Specified in Product Sections:
 - 1. Submit to Architect/Engineer for aesthetic, color, or finish selection.
 - 2. Submit samples of finishes from full range of manufacturers' standard colors, textures, and patterns for Architect/Engineer selection.
- C. Submit samples to illustrate functional and aesthetic characteristics of Products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- D. Include identification on each sample, with full Project information.
- E. Submit number of samples specified in individual specification sections; Architect/Engineer will retain (2) two samples.
- F. Reviewed samples which may be used in the Work are indicated in individual specification sections.

1.7 CERTIFICATES

- A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Architect/Engineer, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect/Engineer.

1.8 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, to Architect/Engineer for delivery to Owner in quantities specified for Product Data.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product options.
- E. Product substitution procedures.
- F. Equipment electrical characteristics and components.

1.2 PRODUCTS

- A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- C. Furnish interchangeable components from same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

- D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- E. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 PRODUCT OPTIONS

- A. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article.

1.6 PRODUCT SUBSTITUTION PROCEDURES

- A. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.
- B. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- C. Substitution Submittal Procedure:
 - 1. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.

END OF SECTION

SECTION 01 70 00

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Protecting installed construction.
- D. Project record documents.
- E. Spare parts and maintenance products.
- F. Maintenance service.

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/Engineer's review.
- B. 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 project assessment.
- B. Clean interior surfaces exposed to view and; remove temporary labels.
- C. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.
- D. Remove waste and surplus materials, rubbish, and construction facilities from the project area.

1.4 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- C. Protect finished floors from traffic, dirt, wear, damage, or movement of heavy objects.

1.5 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings, Product Data, and Samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and modifications.
- F. Record / Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Field changes of dimension and detail.
 - 2. Details not on original Contract drawings.
- G. Submit documents to Architect/Engineer with claim for final Application for Payment.

1.6 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Furnish spare parts, maintenance, and extra products in quantities specified in individual specification sections.
- B. Deliver to and place in location as directed by Owner; obtain receipt prior to final payment.

1.7 MAINTENANCE SERVICE

- A. Furnish service and maintenance of all components installed for (1) one year from date of Substantial Completion.
- B. Examine system components at frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by manufacturer of original component.

END OF SECTION

SECTION 02 41 19

SELECTIVE STRUCTURE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Demolishing designated building equipment and fixtures.
 - 2. Demolishing designated construction.
 - 3. Cutting and alterations for completion of the Work.
 - 4. Removing designated items for reuse and Owner's retention.
 - 5. Protecting items designated to remain.
 - 6. Removing demolished materials.

1.2 SUBMITTALS

- A. Section 01 33 00 – Submittal Procedures: Requirements for submittals.
- B. Demolition Schedule: Indicate overall schedule and interruptions required for utility and building services.
- C. Shop Drawings:
 - 1. Indicate demolition and removal sequence.

1.3 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 – Execution of Closeout Requirements: Requirements for submittals.

1.4 QUALITY ASSURANCE

- A. Conform to applicable code for demolition work, dust control, products requiring electrical disconnection and re-connection.
- B. Conform to applicable code for procedures when hazardous or contaminated materials are discovered.
- C. Obtain required permits from authorities having jurisdiction.
- D. Perform Work in accordance with State, and Municipality standard.

1.5 PRE-INSTALLATION MEETINGS

- A. Convene minimum one week prior to commencing work of this section.

1.6 SEQUENCING

- A. Section 01 10 00 – Summary: Requirements for sequencing.

- B. Contractor shall sequence activities to expedite the Work.
- C. Owner will conduct salvage operations before demolition begins to remove materials Owner chooses to retain.

1.7 SCHEDULING

- A. Section 01 33 00 – Submittal Procedures: Requirements for scheduling.
- B. Cooperate with the Owner in scheduling noisy, dusty and odor producing operations and waste removal that may impact Owners operation and occupancy in adjoining spaces.
 - 1. It may/will be necessary to perform Work on Saturdays and Sundays.
- C. Coordinate utility and building service interruptions with Owner.
 - 1. Do not disable or disrupt building fire or life safety systems without three (3) days prior written notice to Owner.
 - 2. Schedule tie-ins to existing systems to minimize disruption.
 - 3. Coordinate Work to ensure fire alarms, smoke detectors, emergency lighting, exit signs and other life safety systems remain in full operation in occupied areas.

1.8 PROJECT CONDITIONS

- A. Conduct demolition to minimize interference with adjacent and occupied building areas.
- B. Cease operations immediately if structure appears to be in danger and notify Architect/Engineer. Do not resume operations until directed.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 PREPARATION

- A. Notify affected utility companies before starting work and comply with their requirements.
- B. Mark location and termination of utilities.
- C. Erect, and maintain temporary barriers and security devices at work locations, including warning signs and lights, and similar measures, for protection of the Owner, and existing improvements indicated to remain.
- D. Seal all openings and provide ventilation to prevent odors passing into the occupied spaces of the building.

3.2 SALVAGE REQUIREMENTS

- A. Coordinate with Owner to identify building components and equipment required to be removed and delivered to Owner.
- B. Tag components and equipment Owner designates for salvage.
- C. Protect designated salvage items from demolition operations until items can be removed.
- D. Carefully remove building components and equipment indicated to be salvaged.
- E. Disassemble as required to permit removal from building.
- F. Package small and loose parts to avoid loss.
- G. Mark equipment and packaged parts to permit identification and consolidation of components of each salvaged item.
- H. Prepare assembly instructions consistent with disassembled parts. Package assembly instructions in protective envelope and securely attach to each disassembled salvaged item.
- I. Deliver salvaged items to Owner. Obtain signed receipt from Owner.

3.3 DEMOLITION

- A. Conduct demolition to minimize interference with adjacent and occupied building areas.
- B. Maintain protected egress from and access to adjacent existing buildings at all times.
- C. Disconnect and remove designated utilities within demolition areas.
- D. Cap and identify abandoned utilities at termination points when utility is not completely removed. Annotate Record Drawings indicating location and type of service for capped utilities remaining after demolition.
- E. Demolish in orderly and careful manner. Protect existing improvements.
- F. Carefully remove building components indicated to be reused.
 - 1. Disassemble components as required to permit removal.
 - 2. Package small and loose parts to avoid loss.
 - 3. Mark components and packaged parts to permit reinstallation.
 - 4. Store components, protected from construction operations, until reinstalled.
- G. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.

- H. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.
- I. Remove temporary Work.
- J. Protect all materials and equipment remaining.

END OF SECTION

SECTION 07 31 13

ASPHALT SHINGLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Asphalt shingles.
2. Ice dam membrane.
3. Underlayment.
4. Valley protection.
5. Ridge vents.
6. Metal flashings and accessories.
7. Fall protection devices

1.2 REFERENCE STANDARDS

A. ASTM International:

1. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM A755 - Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
3. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
4. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction.
5. ASTM C1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
6. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
7. ASTM D225 - Standard Specification for Asphalt Shingles (Organic Felt) Surfaced With Mineral Granules.
8. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
9. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
10. ASTM D2178 - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
11. ASTM D3018 - Standard Specification for Class A Asphalt Shingles Surfaced with Mineral Granules.

12. ASTM D3161 - Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method).
13. ASTM D3462 - Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules.
14. ASTM D3909 - Standard Specification for Asphalt Roll Roofing (Glass Felt) Surfaced With Mineral Granules.
15. ASTM D4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
16. ASTM D6380 - Standard Specification for Asphalt Roll Roofing (Organic Felt).
17. ASTM D7158 -- Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method).
18. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings.
19. ASTM E408 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
20. ASTM E1918 - Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
21. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
22. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

B. National Roofing Contractors Association:

1. NRCA - The NRCA Roofing Manual: Steep-slope Roof Systems.

C. Underwriters Laboratories Inc.:

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

D. U.S. Environmental Protection Agency:

1. ENERGY STAR - ENERGY STAR Voluntary Labeling Program.

1.3 COORDINATION

- A. Section 01 30 00 - Administrative Requirements specifies requirements for coordination.
- B. Coordinate Work of this Section with products and materials that penetrate roof surfaces, overlap flashing systems specified herein.

1.4 PREINSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements specifies requirements for preinstallation meeting.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

- B. Product Data: Submit data for shingles, underlayments, ice dam membranes, gutters and downspouts and prefinished flashing materials.
- C. Shop Drawings: Indicate specially configured metal flashings, jointing methods and locations, fastening methods and locations, and installation details.
- D. Samples: Submit manufacturer's sample board for each shingle color, indicating full color range and finish texture/pattern for color and texture selection.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Test and Evaluation Reports: Submit report of roof inspection verifying shingles are sealed. Indicate extent of areas that did not properly self-seal and what corrective measures were required.
- G. Manufacturer's Instructions: Submit installation criteria and procedures.
- H. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- I. Qualifications Statement:
 - 1. Submit qualifications for installer.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements specifies requirements for maintenance materials.
- B. Extra Stock Materials:
 - 1. Furnish three bundles (one square) of extra shingles of each color selected.

1.7 QUALITY ASSURANCE

- A. Perform Work according to manufactures standards.
- B. Maintain copy of each standard affecting the Work of this Section on-Site.

1.8 QUALIFICATIONS

- A. Installer: Company specializing in performing Work of this Section with minimum five years' documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's unopened packaging. Do not deliver until roof deck is prepared for installation.

- B. Store materials on roof deck and evenly distribute weight of bundles.

1.10 AMBIENT CONDITIONS

- A. Do not install ice dam membrane and shingles when surface, ambient air or wind chill temperatures are below 45 degrees F.

1.11 WARRANTY

- A. Section 01 70 d00 - Execution and Closeout Requirements: Requirements for warranties.
- B. Furnish lifetime manufacturer's warranty for asphalt shingles.
- C. Warranty Transferability Clause: Make available to Owner shingle manufacturer's standard option for transferring warranty to a new owner.

PART 2 - PRODUCTS

2.1 ASPHALT SHINGLES

- A. Manufacturers:
 - 1. IKO Industries Inc.
GAF
CertainTeed Corporation
Owens Corning
 - 2. Substitutions: Not permitted.
- B. Description: ASTM D3018, UL 790 Class A, Type I, self-sealing; organic-felt or glass-fiber mat base, mineral-granule-surface type; 90 lb./100 sq. ft. weight; laminated overlay staggered-edge butt type; color and texture as selected by owner representative.
- C. Performance and Design Criteria:
 - 1. Provide materials according to The NRCA Roofing Manual: Steep-slope Roof Systems.
 - 2. Roof Covering Fire Classification: Minimum Class A when tested according to ASTM E108 or UL 790.
 - 3. Roof Covering Wind Classification: ASTM D3161, Class F or ASTM D7158, Class H.
 - a. Wind Rating: 120 mph.
 - 4. Roof Covering Impact Classification: ASTM D2218, Class IV.
 - 5. Apply label from agency approved by authority having jurisdiction to identify each roof-assembly component.

2.2 RIDGE, HIP, AND EAVE VENTS

A. Manufacturers:

1. IKO Industries Inc.
GAF
CertainTeed Corporation
Owens Corning

2. Substitutions: Not permitted.

B. Ridge and Hip Vents: Continuous-style louver, plastic, shingle-over type, nominal 12 inches wide with vent openings that do not permit direct water or weather entry; to receive cap shingles; minimum 12-sq. in./ft. net free area.

1. Fire Classification: UL Class A.

C. Starter and End Caps: As required to suit application.

2.3 MATERIALS

A. Ice Dam Membrane: ASTM D1970; self-adhering, polymer-modified bituminous sheet material, granule surface, 40 mil thick, 36 inches wide, with strippable release paper to expose adhesive surface.

B. Underlayment: ASTM D2178, Type IV, asphalt-saturated glass-fiber felts.

2.4 FABRICATION

A. Form flashings to profiles indicated on Drawings, and to protect roofing materials from physical damage and shed water.

B. Form eave edge and gable edge flashing to extend minimum 2 inches onto roof and minimum 1/4 inch below sheathing.

C. Form flashing sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.

D. Hem exposed edges of flashings minimum 1/4 inch on underside.

E. Apply bituminous paint on concealed surfaces of flashings.

2.5 ACCESSORIES

A. Nails: According to ASTM F1667; standard round-wire roofing nails, hot-dip-galvanized-steel type; minimum 0.105-inch-diameter shank, minimum 0.375-inch-diameter head; of sufficient length to penetrate through plywood roof sheathing.

- B. Plastic Cement: ASTM D4586, Asphalt type with mineral fiber components, free of toxic solvents, capable of setting within 24 hours at a temperature of 75 degrees F and 50 percent RH.
- C. Lap Cement: Fibrated, cutback-asphalt type; recommended for use in application of underlayment; free of toxic solvents.
- D. Flashing Materials:
 - 1. Prefinished Galvanized Steel Sheet: According to ASTM A755; structural steel sheet, G90 zinc coating; 0.024-inch-thick core steel, shop pre-coated with silicone polyester, top coat; color as selected.
- E. Bituminous Paint: Acid- and alkali-resistant type; black color.
- F. Fall Protection devices as indicated on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that roof penetrations and plumbing stacks are in place and flashed to deck surface.
- C. Verify that roof openings are correctly framed.
- D. Verify that deck surfaces are dry and free of ridges, warps, or voids.

3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Fill knot holes and surface cracks with latex filler at areas of bonded ice dam membrane.
- C. Broom-clean deck surfaces under ice dam membrane and underlayment.

3.3 INSTALLATION

- A. Ice Dam Membrane Installation:
 - 1. Place eave edge metal flashings tight with fascia boards. Weather-lap joints minimum 2 inches and seal with plastic cement. Secure flange with nails at maximum 12 inches o.c.

2. Install ice dam membrane parallel with eave edge, flush with face of eave edge flashing with edges lapped 3 inches shingle-style and ends lapped 6 inches and staggered between rows.
3. Extend ice dam membrane minimum 4 feet up slope beyond interior face of exterior wall.

B. Underlayment Installation:

1. Place one ply of underlayment over substrate not covered by ice dam membrane, with ends and edges weather lapped 2 inches. Stagger end laps of each consecutive layer. Weather-lap ice dam membrane minimum 2 inches. Nail underlayment in place.
2. Place 19-inch-wide ply of underlayment over substrate not covered by ice dam membrane, with ends lapped minimum 2 inches. Weather-lap ice dam membrane minimum 2 inches. Nail underlayment in place.
3. Place second ply of underlayment over first layer, lapping first layer 19 inches. Lap ends minimum 2 inches. Stagger end laps of each consecutive layer. Nail underlayment in place.
4. Install underlayment according to manufacturer's instructions without distortions capable of preventing shingles from sealing. Nail underlayment overlap at 36 inches o.c.
5. Weather-lap and seal items projecting through or mounted on roof watertight with plastic cement.

C. Valley Protection Installation:

1. Ice Dam Membrane, Closed Valleys:
 - a. Place ice dam membrane sheet, 36 inches wide, centered over valley as valley protection. Weather-lap joints minimum 3 inches.

D. Roof Penetrations:

1. Place ice dam membrane sheet, 36 inches wide, at joint of roof plane and vertical surfaces, including walls, dormers, and vents. Extend vertically to top of curb or minimum 8 inches above level of roof. Weather-lap edge joints minimum 3 inches and lap end joints minimum 6 inches.

E. Metal Flashing and Accessories Installation:

1. Weather-lap joints minimum 2 inches and seal weathertight with plastic cement.
2. Secure in place with nails. Conceal fastenings.
3. Flash and seal Work weathertight, projecting through or mounted on roofing with plastic cement.

F. Asphalt Shingles Installation:

1. Install shingles according to manufacturer's instructions, using no less than minimum number of fasteners per shingle than required for wind-load rating.
2. Place shingles in straight coursing pattern with manufacturer required weather exposure to produce double thickness over full roof area.
3. Project starter course and first course of shingles 3/4 inch beyond eave flashing and fascia boards.

4. Extend shingles 1/2 inch beyond face of gable edge flashing and fascia boards.
5. Extend shingles on one slope across valley and fasten. Trim shingles from other slope 2 inches from valley center line to achieve closed-cut valley, concealing valley protection.
6. Cap hips and ridges with individual shingles, maintaining 5-inch weather exposure. Place to avoid exposed nails.
7. After installation, place two daubs of plastic cement, 1-inch diameter, under each individual shingle tab exposed to weather to prevent lifting.
8. Install ridge vents centered over ridge. Coordinate required ridge opening with Section 076200 - Sheet Metal Flashing and Trim for required free area vent to attic space.
9. Cap hips and ridges with individual shingles, maintaining 5-inch weather exposure. Place to avoid exposed nails.
10. Install roof vents according to manufacturer's instructions.
11. Coordinate installation of roof-mounted components or items projecting through roof with weathertight placement of ice dam membrane and counterflashings.
12. Complete installation to provide weathertight service.

3.4 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- B. Before Substantial Completion, inspect roof to verify shingles self-sealed from exposure to prevent wind uplift. Apply plastic cement to secure shingles that failed to seal. Report results of inspection and required corrective measures.

3.5 PROTECTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Do not permit traffic over finished roof surfaces.

END OF SECTION

SECTION 07 31 26

SLATE ROOFING SHINGLES

General Installation Guidelines for Natural Quarried Roofing Slate

Version 1.5, October, 2017



Slate Roofing Contractors Association of North America, Inc.

143 Forest Lane, Grove City, PA 16127

Ph: 814-786-7015; Web: SlateRoofers.org; Email: mail@slateroofers.org

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INTRODUCTION

These Installation Guidelines have been developed and produced for the general public by professional slate roofing contractor members of the Slate Roofing Contractors Association of North America, Inc., a 501c6 non-profit international trade association, via a peer-reviewed, consensus-based committee process taking place over an extended period of time. These Installation Guidelines, if followed, are designed to produce a long-lasting, weathertight slate roof for most basic applications. Refer to the SRCA Section 07310 “Slate Shingles” for architectural specifications.

PART 1 — GENERAL PROJECT PREPARATION AND EXECUTION

1.1. CONTRACTORS

A. It is recommended that prospective contractors have foremen or supervisors who have a minimum of five years of professional experience in installing natural quarried slate roofing and who can provide a resume listing successful completion of slate roof installations of similar size and scope.

B. Contractors shall furnish all insurance, permits, labor, materials, equipment, apparatus, tools, transportation and services necessary for, and incidental to, the proper installation and completion of the slate roof. This work may include removing and properly disposing off-site of existing slate roofing or other shingles, if any; installing underlayment; installing new sheet metal flashings, and installing new or salvaged roofing slate to cover the entire existing slate roof area, leaving a very long term, damage resistant, weatherproof roof.

C. Contractors shall use workmen who are trained and experienced in laying slate, installing metal flashing, and all other skills needed to satisfactorily complete the project as specified, or use workmen who are under the full-time supervision of a foreman or supervisor with such training and experience.

D. Contractors shall use workmen familiar with the use of slate hammers for punching and nailing slate shingles, slate rippers for removing slates already installed, slate cutters for trimming and cutting slate shingles, slater’s stakes used with slate hammers that have a cutting shank, roof brackets and scaffolding for staging the roof, and hook ladders for accessing areas of the roof not staged.

1.2. CONTRACT DOCUMENTS

A. Contractors will provide contract documents that include detailed specifications for all materials and installation styles, including, but not limited to slate types, thicknesses, colors, and

origins; nail types and lengths; underlayment types and weights; headlaps; ridge style; valley style; flashing materials, including weights, types and sizes of metals.

B. Contract documents shall also include a detailed warranty (see Section 1.8). It is recommended that this SRCA General Roofing Installation Guidelines for Natural Quarried Slate document be attached to the contract as an addendum.

1.3. MATERIALS DELIVERY AND STORAGE

A. Slate roofing shingles shall be delivered on manufacturer's skids with intact labels indicating source whenever possible.

B. Rolled underlayments shall be stored on end and manufacturer's recommendations for job-site storage and protection shall be followed.

C. Materials shall not be stored on existing fire escapes, in areas that may obstruct the ingress or egress of essential doorways or walkways, or on low-slope roofs or other roof slopes where the weight of the materials may damage the roof structure.

1.4 CODES AND REGULATIONS

A. Contractor shall comply with all federal, state, local and contractual regulations regarding specific installations, and abide by applicable building, safety and health codes related to construction practices or use of equipment.

B. Contractor shall comply with the regulations of local governing Historical Societies and the National Registry of Historic Properties, when applicable.

1.5 PROTECTION OF ROOF SURFACES

A. Workers shall not damage slates by walking on them.

B. The roof shall be properly staged to allow safe work surfaces, such as with roof brackets and scaffold-grade planks, that prevent unnecessary foot traffic on the slates.

C. Where foot traffic is unavoidable, roof ladders, hook ladders, chicken ladders, foam pads or other such devices should be used to protect the slates.

1.6 INSURANCE

A. Contractor shall carry Liability Insurance and Workers Compensation Insurance according to state requirements.

B. Contractor will provide, upon request, Certificates of Insurance to Owner prior to the execution of any work.

1.7 CLEAN UP

- A. Tools, equipment, surplus materials, slate scraps, and debris resulting from the slate roof installation shall be organized and cleaned up, or removed and properly disposed of, on a daily basis.
- B. Gutters and roof areas will be cleaned of debris at the end of each work day and upon completion of the work.
- C. Dust and dirt may infiltrate into the attic space during installation or removal of roofing slate. Owner shall be advised to remove any valuable items from the attic space and/or to cover such items with plastic, tarps, or other suitable covering prior to the commencement of any work.

1.8 WARRANTY

- A. Contractor shall warranty a new slate roof installation, covering both material and labor for defects that may occur, for a minimum period of five years.
- B. Owner shall visually inspect the Work on an annual basis and report to the contractor any observed defects that are covered by the warranty.
- C. The contractor cannot be held responsible for damage caused by other persons or by unusual and damaging weather events such as large hail, strong winds, lightning, flooding, earthquakes, excessive snow and ice buildup, or other “acts of God.”
- D. Contractor's warranty terms shall be clearly detailed in the contract documents.
- E. An extended service maintenance agreement is recommended beyond the warranty period.

1.9 EXTRA MATERIAL

- A. Contractor shall provide for the Owner two percent of field slates used in the Work as maintenance stock for future repairs.
- B. The maintenance stock is to be placed in storage in a location at the work site to be determined by the Owner.

PART 2 — ROOFING SLATE

2.1 PROCUREMENT

- A. Procure new roofing slates from known sources so that additional matching supplies can be obtained if needed. A single quarry source is recommended.
- B. Slates shall be supplied by manufacturers that are experienced in the production of roofing slate and that quarry or mine high-quality rock specifically selected for roofing grade applications.

Provide manufacturer's warranty in writing. Substitution of slates with slates from other sources shall not be permitted without written approval from the Owner or architect.

C. Slates shall be identified and labeled according to the quarry source and location. For example, foreign slates shall not be misrepresented as domestic slates.

D. When ordering field slates, whenever possible, also procure the starter slates from the same manufacturer, punched for nail holes to allow the starter slates to be laid back side out. The starter slates should be the same width as the field slates (when uniform width slates are used), and long enough to allow for a minimum headlap of three inches on the starter course.

E. Refer to http://slateroofers.org/sources_new_slate.html for sources of new roofing slate.

2.2 QUALITY CONTROL

A. Slates shall conform to ASTM C 406 and shall be Grade S1 (minimum 575 lbf breaking load¹, maximum 0.25% absorption², and maximum 0.002 inches depth of softening³).

[¹ASTM C120, Test Methods of Flexure Testing of Slate (Breaking Load, Modulus of Rupture, Modulus of Elasticity); ²ASTM C 121, Test Method for Water Absorption of Slate; ³ASTM C 217, Test Method for Weather Resistance of Slate]

B. All slate shall be hard, dense, sound rock of natural cleft with chamfered (beveled) edges. No broken or cracked slate shall be used, although broken slates may be cut into smaller, unbroken pieces.

C. Slates up to 3/8" in thickness shall be punched for nail holes; slates over 3/8" in thickness may be drilled and countersunk, for a minimum of two nail holes each. The holes punched in the slates shall be the correct diameter to provide a snug fit for the shank of the roofing nails. Slates shall be punched back to front (except starter slates, which are punched front to back). Slates shall be punched on the thinner end if there is a variation in the thickness along the length of the slate.

D. Rectangular slates with broken corners on the exposed end shall be rejected if a corner is broken off greater than 1.5 inches in either direction, although such slates may be used for cutting into smaller pieces.

E. Curvature of slates shall not exceed 1/8 inch over a distance of 12 inches. Curved slates shall be trimmed and punched to permit them to be laid with the convex side facing up.

F. Defects in slates such as "knuckles," "knots," "knurls" and "cramps" which protrude above the surface of the slates shall be positioned such that they remain on the exposed top surface of the slate after installation. Knots, knurls and cramps shall not be permitted on the back or covered portions of the slates unless removed by grinding beforehand. A slate shall be rejected if a surface defect adversely affects the proper laying of the slate.

G. Slates shall be free of pyrite inclusions that can visibly leach rust stains onto the roof.

H. Slates shall not have carbon-bearing bands known as “ribbons” as these are considered defects that undermine the longevity of the slate.

I. Nail holes are to be positioned no more than 1.5” in from the side edges of the slate. Nail holes must be positioned approximately 2/3 the distance from the bottom of the slate when using standard 3” headlap. The top of the underlying slate shall not be penetrated by the slating nails.

2.3 INSTALLATION STYLES

A. Slate installation styles may include, but are not limited to:

1. A “standard” pattern where all of the slates are the same length and width, although these can include slates of differing colors and shapes;
2. A “random width” style where the slates are the same length, but differing widths;
3. A “textural” style where thicknesses, textures, colors, lengths, widths and types of slate may be blended for architectural effect;
4. A “graduated” style where thicker or longer slates are installed near the eaves and the slates gradually decrease in size as they near the top of the roof;
5. A “staggered butt” style where slates of varying lengths are installed in such a manner that the exposed butts are staggered.

B. When mixed, graduated, or textural slate styles are to be installed, or slates with mixed colors, sizes, types and/or thicknesses, the quantities of the various sizes and types of slates and the layout patterns of the slates are to be clearly specified in the contract documents.

C. If necessary, build mockups to demonstrate aesthetic effects and to set quality standards.

1. Use materials specified for the project in the mockup.
2. Retain mockup for duration of the project.
3. Approved mockups may become part of the completed work.

PART 3 — GENERAL MATERIALS

3.1 ROOFING UNDERLAYMENT

A. Cover surfaces to be slated with roofing underlayment to weather in the building, when needed.

B. Roofing underlayment shall, at a minimum, comply with ASTM D 226 asphalt-saturated organic felt, Type II, No. 30, unperforated.

C. Felt shall be installed horizontally with sections overlapped toward eaves or drains by a minimum of two inches and at ends by a minimum of six inches. The felt shall overlap hips and ridges by approximately 12 inches. All felt shall be preserved unbroken, tight, and whole.

D. Felt shall be secured with minimum 1" electro-galvanized roofing nails along laps, ends, and in the field as necessary to properly hold the felt in place and to protect the building from water infiltration until covered with slate.

E. The maximum length of exposure for felts prior to slating shall be one month. When the felt must be left for long periods before the slates can be installed, the exposed nail heads are to be skimmed over with a thin layer of trowel grade roof mastic to prevent leakage around the nail heads.

F. When self-adhesive underlayment is used along eaves or elsewhere, it shall be covered with felt.

G. On slopes from 4:12 to 12:12, a half-lapped double layer of No. 30 felt is recommended when the felt is not going to be slated over immediately. Slopes over 12:12 may use a single layer of felt as may any slope that is to be slated within a few days.

H. Additional underlayment may also be used in ice-dam prone areas, such as Type II felt installed on top of the existing felt, with a layer of trowel-grade roof mastic spread evenly underneath the additional felt layer.

3.2 NAILS

A. Nails shall be solid copper, smooth-shank roofing nails, minimum 11 gauge, minimum 1.25" length. Copper nails 2.5" or longer shall be minimum 10 gauge. Alternatively, Type 304 smooth-shank stainless steel roofing nails can be used, not less than 1.25" long.

B. Hot-dipped galvanized smooth-shank roofing nails may be utilized when specified.

C. Nail length is to be approximately twice the thickness of the slates plus one inch. Nails are to fully embed into the roof decking material without more than 1/4" nail length being exposed on the underside of the roof decking. When the underside of the roof decking is exposed, such as at overhanging eaves, the nails shall be long enough to penetrate the roof decking, but not so long that they may be visibly driven through.

D. Recommended nail lengths are as follows when 1" or thicker roof deck is utilized:

1. 3/16"-1/4" thick slates are to be fastened with 1.5" nails.

2. 3/8" thick slates are to be fastened with 1.75" nails.

3. 1/2" thick slates are to be fastened with 2" nails.

4. 3/4" thick slates are to be fastened with 2.5" nails.

5. 1" thick slates are to be fastened with 3" nails.

3.3 FLASHING

A. Flashing shall be minimum 16 ounce copper conforming to ASTM B 370, minimum 28 gauge stainless steel, or minimum 4 lb. sheet lead. Twenty ounce copper flashing is recommended.

B. Flashing shall be installed where there are roof plane intersections, where the roof abuts walls, parapets, dormers and chimneys, or where there are roof penetrations.

C. All flashings and fasteners are to be galvanically compatible metals.

D. Additional flashing guidelines are available from SMACNA's "Architectural Sheet Metal Manual" and the publication "Copper and Common Sense" by Revere Copper Products.

3.4 MASTIC

A. Roof mastic shall be non-asbestos fibered asphalt cement complying with ASTM D 4586.

B. Roof mastic shall be designed for trowel application.

3.5 SLATE HOOKS

A. Slate hooks shall be minimum three inches long, solid copper or stainless steel.

B. Standard slate hooks are for use with slate of commercial standard thickness only. Custom slate hooks may be fabricated for use with thicker slates.

3.6 CANTS

A. Wood cants for installing underneath the starter course of slate shingles shall be minimum 1/4 inch by 1 inch lath or other solid, glue-free wood. Alternatively, minimum 16 ounce copper or 28 gauge stainless steel edging with a built-in cant may be used.

B. When installing standard thickness slates (3/16" to 1/4" thick) the cant should be approximately 1/4" to 3/8". Thicker slates will require a thicker cant.

3.7 ROOF DECKING

A. The roof deck shall be a minimum of 3/4" thick wood. Solid, glue-free wood is recommended.

B. Nailable concrete and gypsum concrete may also be suitable roof decking materials.

C. Minimum 3/4" glue-free slating lath or skip sheathing can be spaced on rafters as a nailing substrate.

D. Minimum 3/4" glue-free boards, slating lath or skip sheathing can be installed over glued or laminated roof decks to provide a suitable nailing substrate.

E. Surfaces to which the roof slates are to be applied shall be in a suitable condition or shall be repaired to a condition satisfactory for slating. All surfaces to be slated shall be swept clean of any debris.

PART 4 — SLATE EXECUTION

4.1 FASTENERS

A. All standard slates shall be fastened with minimum two roofing nails fastened above the head of the underlying slate and as far from the center of the slate as is practical.

B. Larger, heavier slates may need four nails per slate.

C. Screws shall not be used when fastening slates.

D. Slates overlapping sheet metal shall have the nails placed so as to not puncture the metal.

E. Exposed nail heads are not permissible except where unavoidable. Any exposed nail heads shall be sealed with gaskets or approved sealants. The application of slate dust to cover exposed sealants is recommended.

F. Nails shall not be driven in so far as to produce an excessive strain on the slates, and shall instead be driven to a depth such that the nail heads lie within the counter-sunk nail hole and do not rub excessively against the overlying slates.

G. Use of pneumatic or electric nail guns to install slate shingles shall not be permitted.

H. Slates shall not be bedded in roof mastic or other adhesives except where absolutely necessary such as at exposed edges in high-wind areas.

I. Ridges and hips shall be installed without exposed fasteners.

J. If a slating nail is installed in a crack or hole in the sheathing, it shall be renailed properly.

4.2 HEADLAP

A. All standard field slates shall be installed with a minimum 3" head lap when the roof slope is 8:12 up to 20:12.

B. Less than an 8:12 slope down to 4:12, the slates shall be installed with a minimum 4" headlap.

- C. Installing roofing slates on slopes less than 4:12 is not recommended.
- D. On slopes 20:12 or greater, slates may be installed with a 2" headlap.
- E. Headlaps may be increased at ice-dam prone or poor drainage areas.

4.3 EAVES SLATES, EDGE SLATES AND STARTER COURSES

- A. Eave slates shall be laid to provide a minimum 1.5" projection beyond the furthest extent of the fascia, cornice, crown molding, metal drip edge, trim, or other construction material at the eaves.
- B. Rake edge (gable end) slates shall extend 1" beyond the furthest extent of the gable trim, fascia or edge.
- C. Slates at the eaves shall be doubled by first installing a slate starter or under-eave course installed back side up (chamfered side down). The first course of slate shall be laid over the starter course so that the drip edges of both courses align flush. The first course of slates shall break side-butt joints with the starter course side-butt joints by not less than 3". The second course of slates must overlap the starter course by a minimum of 3" and not less than the general headlap of the field slates along the eaves [see Figure 1].
- D. The starter course of slates is to be canted to allow the starter slates to be tilted to the same angle as the field slates.

4.4 SLATE INSTALLATION

- A. Slate shall be installed starting at the bottom or eaves and proceeding toward the ridge or top.
- B. All slates will be installed following chalk lines marking the top edge of each course of slates, whenever possible.
- C. When supplied on pallets, slates are not to be used from one pallet at a time, but are to be used from all pallets simultaneously in order to blend the various pallets uniformly on the roof.
- D. Slate side-butt joints shall be positioned as near the mid-point of the underlying slates as possible, and not less than 3" from the underlying side-butts. Each slate course shall break butt-joints laterally by a minimum of 3", if possible, with the underlying or overlying courses.
- E. When installed, slates shall be laid side-to-side with a maximum 1/8" gap between slates, on average, unless otherwise specified.
- F. Slate will be neatly fitted around any pipes, ventilators, and other roof penetrations.
- G. Slates are to be cut from the back side in order to preserve the chamfered edge on the front exposed surface. Use of grinders, saws, or other mechanical means to cut and trim roofing slates

shall not be permitted unless the slates maintain a chamfered appearance along the exposed sawn edges. At the apex of slated hips and ridges, and at the juncture of a closed valley, the chamfered edge may, as an option, be reversed to create a tighter fitting joint.

H. Slates along valleys shall be cut in neat and straight lines. Valley slates are to be cut on the back side of the slate to maintain a chamfered slate edge when along an open valley.

I. Contractor shall visually and manually inspect the slates when roof brackets are removed to make sure no slates were broken by the roof scaffolding. Upon completion, all slate shall be sound, unbroken, un-cracked, whole and clean, showing no exposed roof cement.

J. Individual slates that must be installed in the field of the roof after the installation is complete, such as where a roof bracket had been removed or where a repair has been made, shall be installed using stainless steel or copper slate hooks or the “nail and hidden bib” installation method where standard nailing is not possible. The top of bib flashings shall extend to the top of the head of the underlying slate.

K. Contractors shall keep the building weatherproof and make every reasonable attempt to complete the project on schedule. Work is to be scheduled when weather conditions allow the work to be performed according to manufacturer’s recommendations and in compliance with warranty requirements.

L. Temporary roof coverings, tarps, or other materials shall remain available onsite in the event that the work must be ceased suddenly due to weather conditions and the roof needs to be weathered in until such time as the work may be continued.

PART 6 — REFERENCE INFORMATION

6.1 ASTM REFERENCES

ASTM A167 — Type 304 Terne coated stainless steel, 0.015 inch (0.38 mm) thick stainless steel core material, coated with 0.092 lb/sq ft (450 g/sq m) Terne alloy on both sides

ASTM A666 — Type 304 stainless steel, soft annealed 2D finish (unless harder temper is required for forming or performance), 0.0156 inch (0.4 mm) thick

ASTM B101 — Specification for Lead-Coated Copper Sheet and Strip for Building Construction

ASTM B370 — Specification for Copper Sheet and Strip for Building Construction

ASTM B749 — Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products

ASTM C406 — Specification for Roofing Slate

ASTM C920 — Specification for Elastomeric Joint Sealants

ASTM C1311 — Specification for Solvent Release Sealants

ASTM D312 — Specification for Asphalt Used in Roofing

ASTM D1079 — Standard Terminology Relating to Roofing, Waterproofing, and Bituminous Materials

ASTM D1970 — Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection

ASTM D2626 — Specification for Asphalt-Saturated and Coated Organic Felt Base Roofing Sheet

ASTM D2822 Specification for Asphalt Roof Cement, Asbestos-Containing

ASTM D3019 — Specification for Lap Cement Used with Asphalt Roll Roofing, Non Fibered, Asbestos, Fibered, and Non Asbestos Fibered

ASTM D4022 — Specification for Coal Tar Roof Cement, Asbestos Containing

ASTM D4586 — Specification for Asphalt Roof Cement, Asbestos-Free.

ASTM D4869 — Specification for Asphalt-Saturated Organic Felt Underlayment for Steep Slope Roofing.

ASTM F1667 — Specification Standard for Driven Fasteners

6.2 SLATE GRADES

- A. ASTM C 406 Grade S1: Expected service life in excess of 75 years.
- B. ASTM C 406 Grade S2: Expected service life 40-75 years.
- C. ASTM C 406 Grade S3: Expected service life 20-40 years.

6.3 SLATE THICKNESSES, SIZES AND COLORS

A. Thicknesses

- 1. Standards; Nominal 3/16 inch (5 mm) to 1/4 inch (7 mm)
- 2. Quarters; Nominal 1/4 inch (7 mm) to 3/8 inch (10 mm)
- 3. Heavies; Nominal 3/8 inch (10 mm) to 1/2 inch (13 mm)
- 4. Extra Heavies; Nominal 1/2 inch (13 mm) to 3/4 inch (19 mm)

B. Standard Slate Sizes

1. 24" L X 14" W (610 mm X 356mm)
2. 24" L X 12" W (610 mm X 305 mm)
3. 22" L X 12" W (559 mm X 305 mm)
4. 22" L X 11" W (559 mm X 279 mm)
5. 20" L X 14" W (508 mm X 356 mm)
6. 20" L X 12" W (508 mm X 305 mm)
7. 20" L X 11" W (508 mm X 279 mm)
8. 20" L X 10" W (508 mm X 254 mm)
9. 18" L X 14" W (457 mm X 356 mm)
10. 18" L X 12" W (457 mm X 305 mm)
11. 18" L X 11" W (457 mm X 279 mm)
12. 18" L X 10" W (457 mm X 254 mm)
13. 18" L X 9" W (457 mm X 229 mm)
14. 16" L X 14" W (406 mm X 356 mm)
15. 16" L X 12" W (406 mm X 305 mm)
16. 16" L X 11" W (406 mm X 279 mm)
17. 16" L X 10" W (406 mm X 254 mm)
18. 16" L X 9" W (406 mm X 229 mm)
19. 16" L X 8" W (406 mm X 203 mm)
20. 14" L X 10" W (356 mm X 254 mm)
21. 14" L X 9" W (356 mm X 229 mm)
22. 14" L X 8" W (356 mm X 203 mm)
23. 14" L X 7" W (356 mm X 178 mm)
24. 12" L X 10" W (305 mm X 254 mm)
25. 12" L X 9" W (305 mm X 229 mm)

26. 12" L X 8" W (305 mm X 203 mm)

27. 12" L X 7" W (305 mm X 178 mm)

28. 12" L X 6" W (305 mm X 152 mm)

C. North American Roofing Slate Colors

1. Unfading Black
2. Semi-Weathering Gray/Black
3. Unfading Gray
4. Semi-Weathering Gray
5. Unfading Purple
6. Semi-Weathering Purple
7. Unfading Mottled Green and Purple
8. Unfading Green
9. Semi-Weathering Green (Sea Green, Gray/Green)
10. Unfading Red

6.4. SLATE EXPOSURES AND HEADLAPS

When Using 3" and 4" Headlaps (showing number of slates per square)

Slate Size (in.)	Exposure (3" H.L.)	Slates/Square	Exp. (4" Headlap)	Slates/Square
6x10	3 1/2"	686	3"	800
7x10	3 1/2"	588	3"	686
8x10	3 1/2"	514	3"	600
6x12	4 1/2"	533	4"	600
7x12	4 1/2"	457	4"	515
8x12	4 1/2"	400	4"	450
9x12	4 1/2"	355	4"	400
10x12	4 1/2"	320	4"	360
7x14	5 1/2"	374	5"	412
8x14	5 1/2"	327	5"	360
9x14	5 1/2"	290	5"	320
10x14	5 1/2"	261	5"	288
12x14	5 1/2"	218	5"	240
8x16	6 1/2"	277	6"	300
9x16	6 1/2"	246	6"	256
10x16	6 1/2"	222	6"	230
12x16	6 1/2"	185	6"	192
9x18	7 1/2"	213	7"	221
10x18	7 1/2"	192	7"	199
11x18	7 1/2"	175	7"	187
12x18	7 1/2"	160	7"	171
10x20	8 1/2"	170	8"	180

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11x20	8 1/2"	154	8"	164
12x20	8 1/2"	141	8"	150
14x20	8 1/2"	121	8"	129
11x22	9 1/2"	138	9"	146
12x22	9 1/2"	126	9"	134
14x22	9 1/2"	109	9"	115
12x24	10 1/2"	114	10"	120
14x24	10 1/2"	98	10"	103

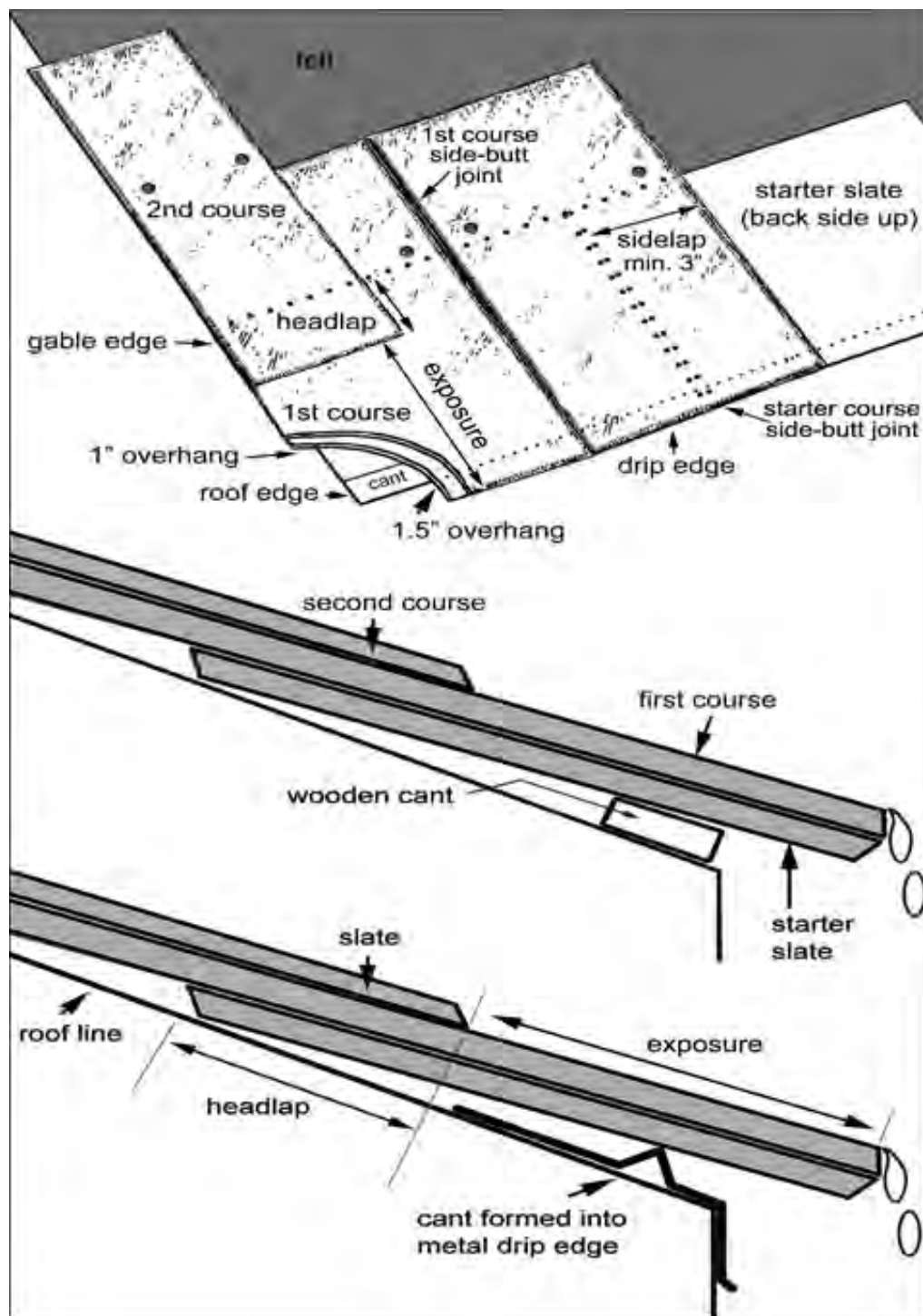


Fig. 1

END OF SECTION

SECTION 07 54 03

SHEET MEMBRANE (PVC) ROOFING - FULLY ADHERED

1.1 SUMMARY

- A. Section Includes:
1. Insulation.
 2. Base flashings.
 3. Sheet membrane roofing.
 4. Counterflashings.

1.2 REFERENCE STANDARDS

- A. ASTM International:
1. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
 2. ASTM C208 - Standard Specification for Cellulosic Fiber Insulating Board.
 3. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation.
 4. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 5. ASTM C728 - Standard Specification for Perlite Thermal Insulation Board.
 6. ASTM C1177 - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 7. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 8. ASTM C1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
 9. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
 10. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
 11. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
 12. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
 13. ASTM D822 - Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
 14. ASTM D1004 - Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
 15. ASTM D4434 - Standard Specification for Poly(Vinyl Chloride) Sheet Roofing.
 16. ASTM D6878 - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing.
 17. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 18. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
 19. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings.

20. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
21. ASTM E408 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
22. ASTM E903 - Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.
23. ASTM E1918 - Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
24. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

B. FM Global:

1. FM DS 1-28 - Wind Design.
2. FM 4450 - Approval Standard for Class 1 Insulated Steel Deck Roofs.

C. Intertek Testing Services (Warnock Hersey Listed):

1. WH - Certification Listings.

D. National Roofing Contractors Association:

1. NRCA - The NRCA Roofing and Waterproofing Manual.

E. Single Ply Roofing Institute:

1. SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

F. UL:

1. UL - Fire Resistance Directory.
2. UL 790 - Standard Test Methods for Fire Tests of Roof Coverings.
3. UL 1256 - Fire Test of Roof Deck Constructions.
4. UL 1897 - Uplift Tests for Roof Covering Systems.

G. U.S. Environmental Protection Agency:

1. ENERGY STAR - ENERGY STAR Voluntary Labeling Program.

1.3 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate Work of this Section with installation of associated roof penetrations and metal flashings.

1.4 PREINSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Requirements for preinstallation meeting.

- B. Review preparation and installation procedures and coordinating and scheduling of related Work.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit characteristics of membrane materials, adhesives, seaming materials, flashing materials, insulation, and vapor retarders.
- C. Shop Drawings:
 - 1. Indicate setting plan for tapered insulation, joint and termination detail conditions, and conditions of interface with other materials.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Instructions: Submit special precautions required for seaming membrane.
- F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- G. Qualifications Statements:
 - 1. Submit qualifications for manufacturer and applicator.
 - 2. Submit manufacturer's approval of applicator.

1.6 QUALITY ASSURANCE

- A. Perform Work according to NRCA Roofing and Waterproofing Manual.
- B. Fire-Rated Roof Construction:
 - 1. Prescriptive Rating:
 - a. Determined according to applicable code.
 - 2. Comply with FM Assembly Design.
- C. Roof Assembly Fire Classification:
 - 1. Minimum Class A when tested according to ASTM E108 or UL 790.
 - 2. Roof Assembly with Foam Insulation: Pass FM 4450 or UL 1256.
- D. Surface-Burning Characteristics:
 - 1. Foam Insulation: Maximum 75/450 flame-spread/smoke-developed index when tested according to ASTM E84.
- E. Apply label from agency approved by authority having jurisdiction to identify each roof assembly component.
- F. Manufacturer's Inspection:

1. Furnish manufacturer services before start of Work of this Section to verify substrate acceptability and review installation procedures and completed Work, such that specified warranty can be issued.
2. Promptly and satisfactorily repair unsatisfactory conditions disclosed by manufacturer's Site visits.

G. Perform Work according to manufacturer's standards.

H. Maintain one copy of each standard affecting Work of this Section on Site.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years' documented experience.
- B. Applicator: Company specializing in performing Work of this Section with minimum five years' documented experience and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Deliver products in manufacturer's original containers, dry, undamaged, and with seals and labels intact.
- C. Store products in weather protected environment, clear of ground and moisture.
- D. Protect foam insulation from direct exposure to sunlight.

1.9 AMBIENT CONDITIONS

- A. Do not apply roofing membrane during inclement weather ambient temperatures below manufactures recommendations without proper weather protection.
- B. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.10 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
- B. Furnish 20-year manufacturer's warranty, including coverage of materials and installation and of resulting damage to building resulting from failure to resist penetration of moisture.

2.1 DESCRIPTION

- A. Sheet Membrane Roofing System: Fully adhered 60 mil one-ply sheet membrane system with vapor retarder, insulation, and adhesive-applied membrane.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Low-Slope Membrane Roof Edge Securement: Conform to SPRI ES-1 for wind speeds determined from applicable code.
- B. Uplift Resistance:
 - 1. Uplift Pressure Resistance: 120 psf.
 - 2. Comply with UL 1897.
- C. Vapor Retarder Permeance: Maximum one perm when tested according to ASTM E96, desiccant method.

2.3 SINGLE PLY ROOFING - FULLY ADHERED

- A. Manufacturers:

Siplast

Firestone

Sika Sarnafil

- 1. Substitutions: Not permitted.

- B. Sheet Vapor Retarder:

- 1. Fire Resistance:
 - a. Fire resistant.
 - b. Comply with FM requirements.
- 2. Materials: Self-adhered vapor barrier per manufacturer requirements.
- 3. Adhesive: Fire retardant.

- C. Insulation:

- 1. Polyisocyanurate:
 - a. Provide R-30 (5.2”), minimum, polyisocyanurate roofing insulation. Achieve 1/8” minimum slope, sloped to the existing drainage system (gutters, scuppers).

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Roof Replacement and Repairs

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- b. Comply with ASTM C1289, Type II, Class 2, Grade 4.
 - c. Minimum Compressive Strength (Grade): 80 psi.
 - d. Board Edges: Square.
- D. Flexible Flashings:
 - 1. Material: Same as membrane.
 - 2. Color: Black.
- E. Coverboard: ½” thick, compatible with roofing system.
- F. Membrane:
 - 1. Material:
 - a. PVC: Comply with ASTM requirements for Type I.
 - 2. Reinforcement: Reinforced.
 - 3. Color: Black.
 - 4. Tensile Strength:
 - a. Comply with ASTM D412.
 - 5. Elongation:
 - a. Comply with ASTM D412.
 - 6. Shore A Hardness:
 - a. Comply with ASTM D2240.
 - 7. Tear Strength:
 - a. Comply with ASTM D624.
 - 8. Water Absorption:
 - a. Comply with ASTM D471.
 - 9. Water Vapor Permeance:
 - a. Comply with ASTM E96 desiccant method.
 - 10. Exposure:
 - a. Comply with ASTM D822.
 - 11. Low-Temperature Brittleness:
 - a. Comply with ASTM D746.
 - 12. Adhesion:
 - a. Comply with ASTM D429.
- G. Seaming Materials: As recommended by membrane manufacturer.
- H. Washer Disc: Membrane material with adhesive backing.
- I. Adhesive Materials:

1. Surface Conditioner:
 - a. Compatible with membrane.
2. Membrane Adhesives: As recommended by membrane manufacturer.
3. Insulation Adhesive: As recommended by insulation manufacturer.
4. Thinner and Cleaner:
 - a. As recommended by adhesive manufacturer.
 - b. Compatible with sheet membrane.

- J. Counterflashings: As specified on drawings.

2.4 SUSTAINABILITY CHARACTERISTICS

- A. Section 018113 - Sustainable Design Requirements: Requirements for sustainable design compliance.
- B. Sustainable Sites Characteristics:
1. Roof Surface:
 - a. Minimum Solar Reflectance Index of 29, calculated according to ASTM E1980.
 - b. Reflectance: Measured according to ASTM C1549, ASTM E903, or ASTM E1918.
 - c. Emittance: Measured according to ASTM C1371 or ASTM E408.

2.5 ACCESSORIES

- A. Sheathing Fasteners:
1. Appropriate for purpose intended.
 2. Approved by FM and system manufacturer.
 3. Length: As required for thickness of material plus metal washers.
- B. Roofing Nails:
1. Type: Galvanized, hot dipped, or non-ferrous type.
 2. Size and Configuration: As required to suit application.
- C. Sealants: As recommended by membrane manufacturer.
- D. Strip Reglet Devices:
1. Material: Galvanized steel.
 2. Maximum possible lengths per location.
 3. Furnish attachment flanges.
- E. Walkway Pads:
1. As supplied by product manufacturer.

- F. Stack Boots: Flexible boot and collar for pipe stacks through membrane.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for application examination.
- B. Verify that surfaces and Site conditions are ready to receive Work.
- C. Verify that deck is supported and secure.
- D. Verify that deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains, valleys, or eaves, and suitable for installation of roof system.
- E. Verify that substrate is acceptable to membrane manufacturer.
- F. Verify that deck surfaces are dry and free of snow or ice.
- G. Confirm dry deck by moisture meter with moisture content acceptable to roofing manufacturer.
- H. Verify that adjacent precast concrete roof members do not vary more than 1/4 inch in height.
- I. Verify that roof openings, curbs, pipes, sleeves, ducts, and vents are solidly set and that wood cant strips, wood nailing strips and reglets are in place.

3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for application preparation.
- B. Wood Deck:
 - 1. Verify that wood decking joints are flat and tight.
 - 2. Seal decking joints with tape.
 - 3. Fill knot holes with latex filler.

3.3 APPLICATION

- A. Vapor Retarder:
 - 1. Provide self-adhering vapor retarder to sheathing surface.
 - 2. Extend vapor retarder under cant strips and blocking to deck edge.
 - 3. Vapor Barrier Seal:
 - a. Lap flexible flashing over vapor and air barrier of wall construction to provide continuity of vapor and air barrier seal.

B. Insulation Application:

1. Ensure that vapor retarder is clean and dry.
2. Apply adhesive to deck and embed insulation into adhesive with full contact.
3. Apply adhesive to top surface of insulation.
4. Embed second layer of insulation into adhesive, with joints staggered minimum 6 inches from joints of first layer.
5. Place constant thickness first layer and tapered thickness insulation second layer to required slope pattern.
6. Minimum Total Insulation Thickness: As required to achieve insulation R-value of R-30.
7. Lay boards with edges in moderate contact without forcing.
8. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
9. Lay tapered boards for distance of 18 inches back from roof drains for positive drainage.
10. Apply no more insulation than can be covered with membrane in same day.
11. Tape insulation joints.

C. Membrane Application:

1. Apply primer.
2. Install according to manufacturer's printed instructions.
3. Mechanically attach membrane disc to roof assembly.
4. Apply adhesive per manufactures requirements.
5. Roll out membrane, free from air pockets, wrinkles, or tears, and firmly press sheet into place without stretching.
6. Bond sheet to substrate, except those areas directly over or within 3 inches of control or expansion joint.
7. Sealing:
 - a. Overlap edges and ends and seal by solvent welding, minimum 3 inches.
 - b. Seal to make membrane permanently waterproof.
8. Shingle joints on sloped substrate in direction of drainage.
9. Extend membrane up cant strips minimum of 6 inches onto vertical surfaces.
10. Seal membrane around roof penetrations.

D. Flashings and Accessories:

1. Apply flexible flashings to seal membrane to vertical elements.
2. Secure to nailing strips at 4 inches o.c. and reglets.
3. Install prefabricated roofing control and expansion joints to isolate roof into areas as indicated on Drawings, and make joints watertight.

3.4 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.

3.5 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Where finished surfaces are soiled by Work of this Section, consult surfaces manufacturer for cleaning advice and conform to manufacturer's documented instructions.
- C. Repair or replace defaced or disfigured finishes caused by Work of this Section.

3.6 PROTECTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect building surfaces against damage from roofing Work.
- C. Do not permit traffic over unprotected floor surfaces.

END OF SECTION

Supreme Systems Inc

788 Sheridan Street

Chicopee, MA 01020

Phone: (413) 331-4490

Fax: (413) 331-4494



ROOFING. DONE. RIGHT.

TO:

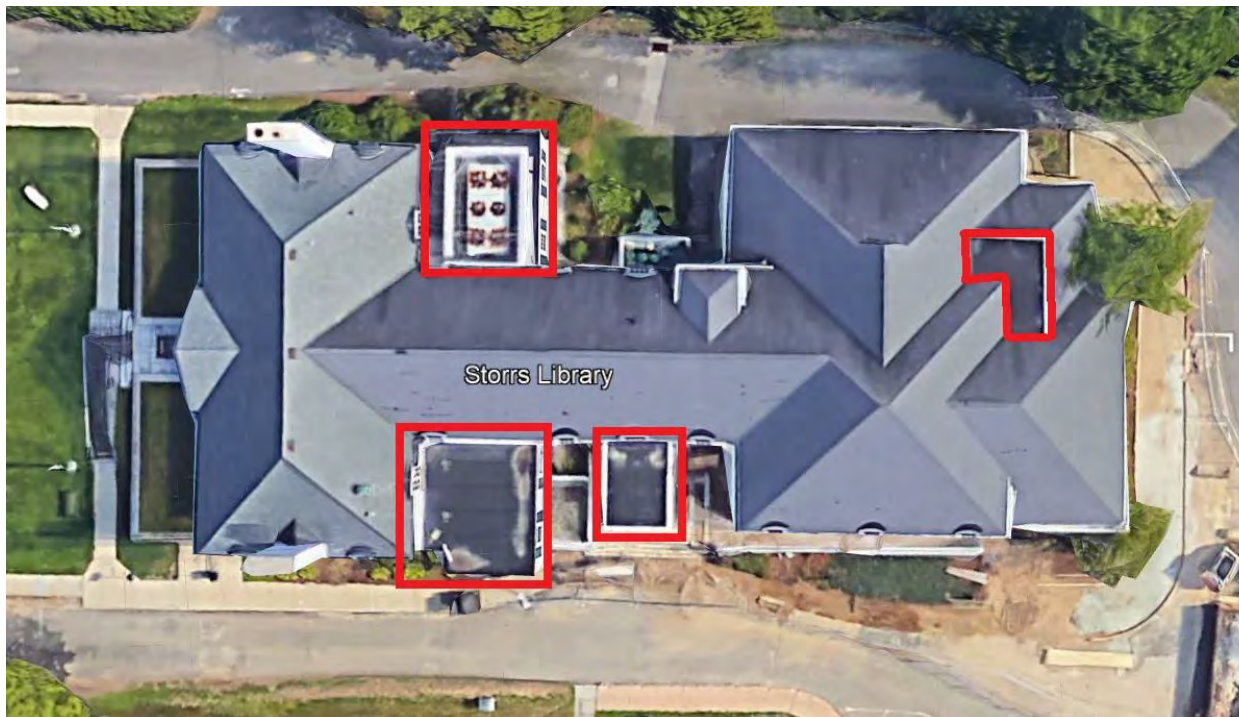
Storrs Library
693 Longmeadow Street
Longmeadow, MA

7/11/2019

Thermal Scan Results & Observations

WORK ORDER #: 3594

ADDRESS: 693 Longmeadow Street, Longmeadow, MA USA



Supreme systems completed a thermal imaging scan of the flat roof areas at stores library and Longmeadow Massachusetts on Thursday, June 27. The daily observation noted no ponding water on the roof system and temperatures between 86 and 90° with 90% sunshine.

The infrared scan was completed between 6:15 and 9:15 in the evening. We were able to access all roof systems using a ladder and all roof membrane(s) were black EPDM which provided optimum results for the FLIR thermal imaging camera. Because the late evening temperature delta was minimal the IR images were noticeable immediately once the sun had set but only remained for 40-60 minutes.

Supreme Systems Inc

788 Sheridan Street

Chicopee, MA 01020

Phone: (413) 331-4490

Fax: (413) 331-4494



ROOFING. DONE. RIGHT.

PATIO ROOF AREA



PATIO ROOF OBSERVATIONS

The thermal images we were able to view on the patio roof indicated slight moisture in the system. Moisture was noted where the downspout from the upper sloped roof empties onto the flat EPDM roof. Upon verification test cut inspection, the insulation was dry and only surface moisture on the backside of the membrane was present. 85 to 95% of this roof area appears to be dry without any moisture. Our test cut indicated a single layer roof system and a plywood deck exists now.

Our suggested scope would be to peel the existing EPDM membrane, this allows you to inspect the existing insulation and replace only what is wet, then mechanically fasten a new cover board insulation (1/2" HD due to counter flashing Heights that exist), and Adhere 060 EPDM to the new substrate per 20 yr warranty spec.

Supreme Systems Inc

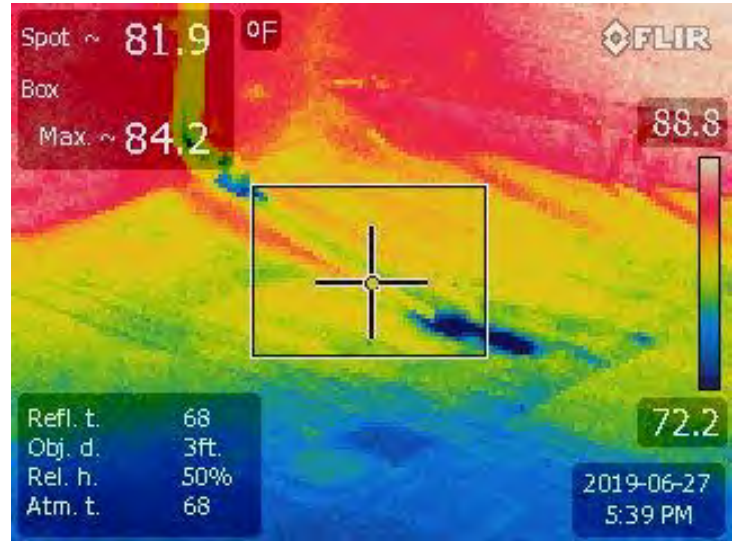
788 Sheridan Street, Chicopee, MA 01020

Phone: (413) 331-4490

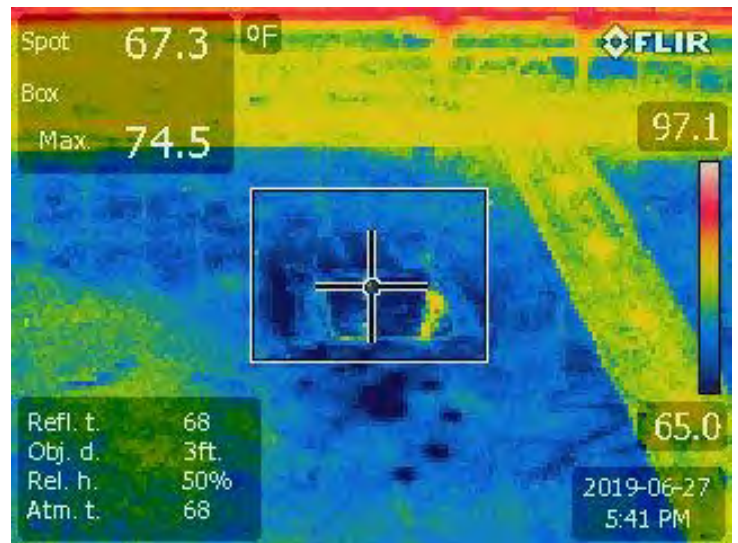
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ROOFING. DONE. RIGHT.



Patio Roof IR Image at Downspout



Verification Test Cut

Patio Roof IR Verification Core

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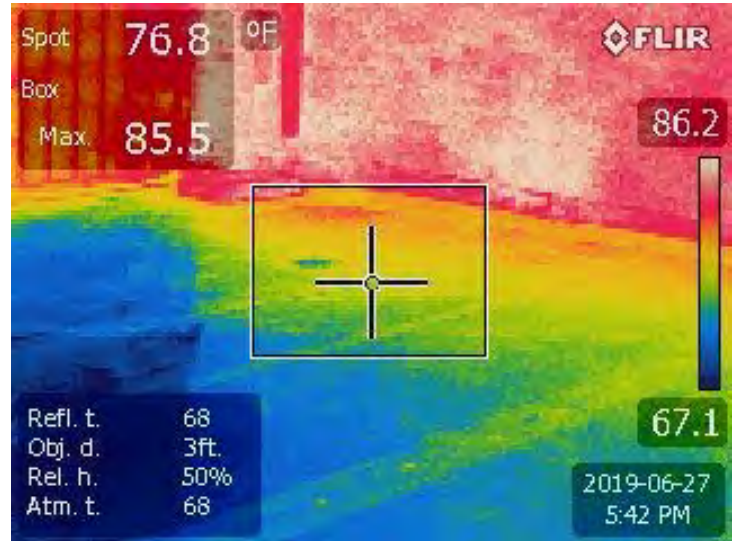
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ROOFING. DONE. RIGHT.



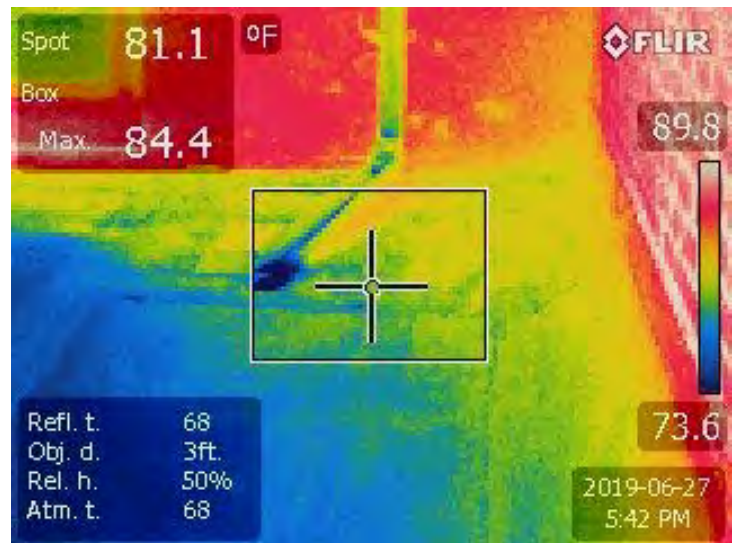
Patio Roof Counter flashing Reference Pic



Patio Roof IR Image Moisture Along Wall



Patio Corner and Wall Reference



Patio IR Image at Corner & Wall

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788 Sheridan Street

Chicopee, MA 01020

Phone: (413) 331-4490

Fax: (413) 331-4494



ROOFING. DONE. RIGHT.

ENTRY ROOF AREA



ENTRY ROOF OBSERVATIONS

The thermal images we observed on the entry roof was in a single area located within the tapered insulation cricket. Upon test cut and visual inspection a filling patch was noted which most likely was the source of water into the system. The overall square footage of moisture content was approximately 4 ft.². 98% of this roof area appeared to be dry without moisture.

Our suggested scope is the same as for the patio roof area. This roof area is a small unheated section that has two drainage scuppers with low counter flashing height at the wall (1/2" HD) preferred here as well.

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788 Sheridan Street, Chicopee, MA 01020

Phone: (413) 331-4490

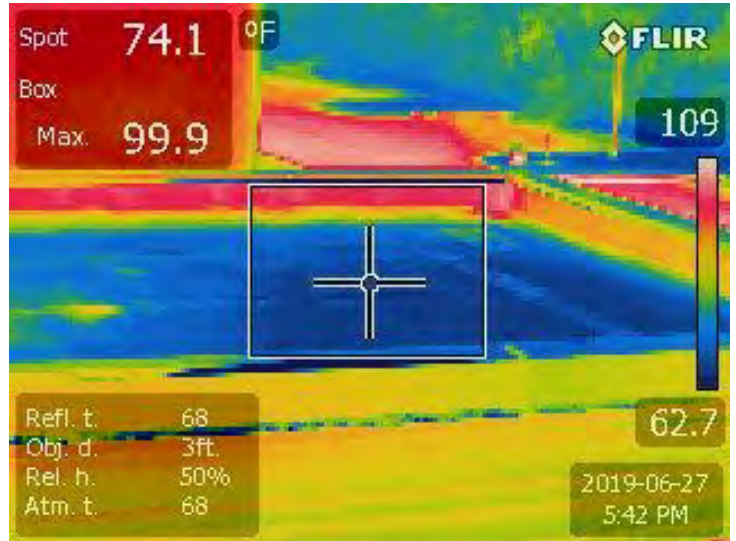
Fax: (413) 331-4494



ROOFING. DONE. RIGHT.



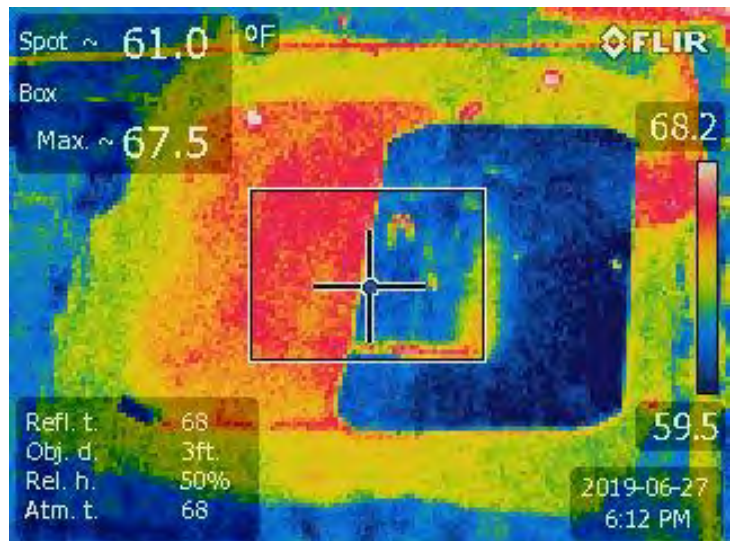
Entry Canopy Overall



Entry Roof Overall IR Image 90% Dry



Rear Entry High Point Test Cut By Others DRY



Rear Entry Verification IR Image

Supreme Systems Inc

788 Sheridan Street

Chicopee, MA 01020

Phone: (413) 331-4490

Fax: (413) 331-4494

SUPREME 
ROOFING. DONE. RIGHT.

REAR ENTRY ROOF AREA



REAR ENTRY ROOF OBSERVATIONS (No Moisture Observed)

The thermal images we were able to view on this small L-shaped EPDM roof area showed no signs of moisture. This roof drained well to a roof edge scupper. The tie-in with the sloped shingle roof appeared to have recent repairs made (debris left on roof).

Our suggested scope would be to maintain this roof area bi-annually considering the existing condition. If replacement was considered, Supreme would suggest the same scope as the patio and entry roof areas.

Supreme Systems Inc

788 Sheridan Street, Chicopee, MA 01020

Phone: (413) 331-4490

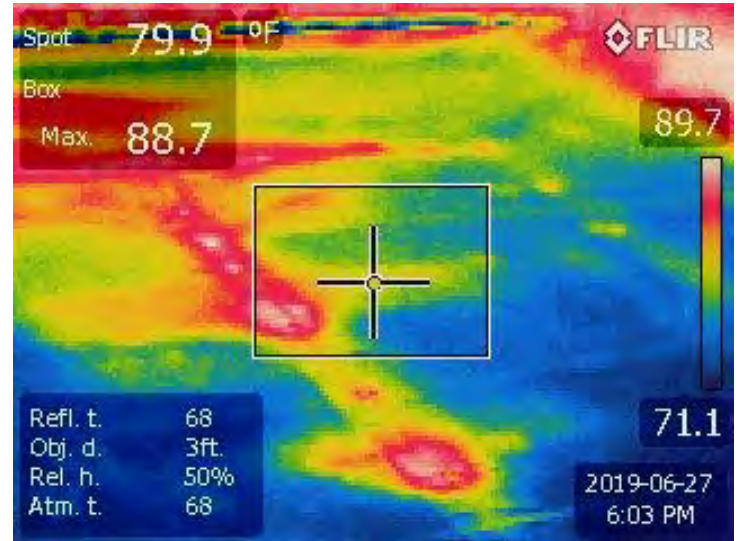
Fax: (413) 331-4494



ROOFING. DONE. RIGHT.



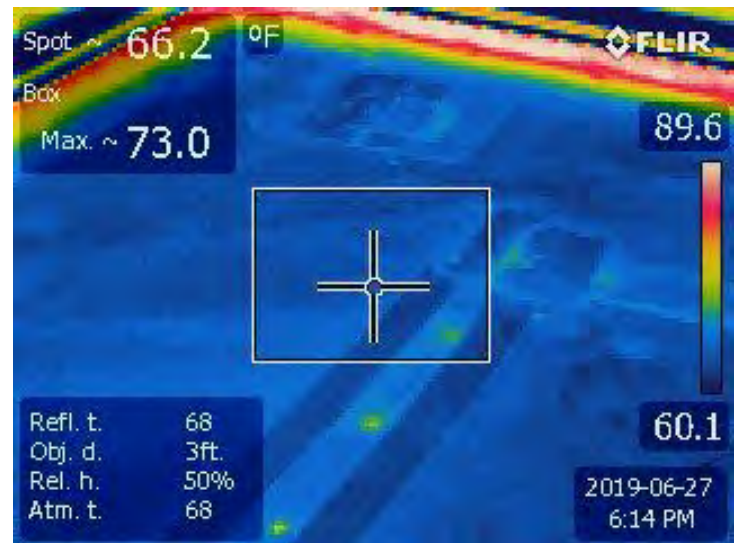
Entry Roof Moisture Noted In Tapered Cricket



Entry Roof IR Image Moisture Noted



Rear Entry Tapered Cricket No Moisture Noted



Rear Entry IR Image - No Moisture

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ROOFING. DONE. RIGHT.

MECHANICAL ROOF AREA



MECHANICAL ROOF OBSERVATIONS

The thermal images we observed on the mechanical roof area indicated moisture was present underneath the condenser unit. The condenser unit sits on steel dunnage which does not penetrate the roof. After a verification test cut was made it appeared that only moisture was present beneath the membrane and both layers of polyiso insulation was dry. The existing roof system is a single layer EPDM with tapered enhancements all adhered to a wood deck.

The total amount of moisture noted was approximately 35 ft.² and we expect was only moisture trapped under the membrane and not saturated insulation. (Ponding water stains indicated in this area). Our test cuts were all dry insulation. (Additional test cuts were made on all roofs by others) Please provide additional test cut information if you have any for us to consider and evaluate.

Our suggested scope would be the same as the patio and entry roof areas. Low flashing Heights does not justify additional insulation and full rip seems unnecessary if leaks are minimal and if the insulation that exists remains to be dry.

Additional Tapered insulation enhancements and roof edge drainage enhancements could also benefit to get water off the roof.