TABLE OF CONTENTS

END OF SECTION

PART 1 – GENERAL

1.01 EXTENT OF SECTION

A. This section contains the requirements relating to thermal and moisture protection; including; waterproofing; damp proofing, air barriers; insulation; exterior insulation and finish systems; fireproofing; and fire stopping.

B. The intent of the PCSB STANDARDS is for the DESIGN PROFESSIONAL (DP) to comply with the minimum general project requirements and the specific project specifications shall be generated and provided by the DP.

PART 2 – THERMAL & MOISTURE BARRIERS

2.01 WALL JOINT SEALANT

A. Silicone based joint sealant shall be used for exterior joints that do not receive a coating, e.g. brick masonry, stone cladding, metal panel systems, curtain wall panels systems, etc.

B. Urethane based joint sealant shall be used for exterior applications that receive a coating material, e.g. Portland cement plaster with a painted surface.

C. Sealant joints shall be constructed with properly sized foam backer rod.

D. Substrate materials may need to be primed to achieve proper adhesion. Field adhesion tests may be required to verify joint construction and adhesion.

2.02 BUILDING INSULATION

A. Insulation materials shall comply with the latest editions of the FBC and ASHRAE 90.1.

B. SECONDARY ATTIC INSULATION BARRIER for renovations or new construction shall adjoin existing construction:
   1. REQUIREMENTS:
      a. Roll Type (foil faced) fiberglass batts with FSK (foil-scrim-kraft) facing shall be laminated to batt insulation or installed as a membrane.
      b. Install facing and insulation on a separately supported suspended grid or by separate furring (¾-inch x 18 gauge metal furring channels at 2-ft. o.c. secured to bottom chord of truss) secured to bottom of roof structure.
      c. All A/C ductwork and other services shall be installed below the insulation.
      d. All FSK seams shall be taped. Overlap ends onto exterior walls and seal to wall with tape or continuous bead of sealant.

C. Insulate walls with exterior exposure and interior walls adjacent to non-air conditioned spaces.

2.03 AIR AND VAPOR BARRIERS

A. Air barrier system performance standards shall be consistent with those established by the Air Barrier Association of America (ABAA), www.airbarrier.org.

B. Air and vapor barriers shall be detailed, specified and installed so that condensation shall not occur within the wall assembly.

C. Roof membrane underlayment, shall be self-sealing, self-healing, fully adhering, premium roof leak protection. The product shall be a minimum of 40 mil. thick.

2.04 EXTERIOR INSULATION AND FINISH SYSTEMS

A. EIFS materials shall only be used to repair existing EIFS systems.

2.05 WATERPROOFING

A. Exterior surfaces of walls constructed below finish grade shall be waterproofed, not damp proofed. Walls with stone or brick veneer constructed below grade shall have the cavities grouted to a line approximately 12-inches above finish grade. Flashing and weeps shall be installed approximately 12-inches above finish grade. Attention should be paid to termination of below grade waterproofing and its incorporation into the building envelope.

B. Modified bituminous membrane waterproofing shall be used for above grade applications.

2.06 DAMPPROOFING

A. Above grade wall surfaces that are concealed by masonry wall panels or brick veneer shall be damp proofed or water proofed to resist water intrusion.

B. Dampproofing may not be required where cement stucco is applied directly to concrete masonry or concrete.
   1. Dampproofing is not required at screen walls or site I.D. sign.

2.07 FLASHING

A. Refer to B.I.A. Technical Notes on Brick Construction 21A and 21B, latest revision.

B. Flashing shall be fabricated and installed so that all water is collected and discharged to the exterior of the building. Membrane or sheet metal flashing systems shall be used.

C. THROUGH-WALL FLASHING: at cavity walls, flashing shall be specified as rigid stainless steel ~~copper-clad flexible membrane and shall conform to ASTM B 370~~. Other locations are at:
   1. Drainage plane interruptions including heads and sills of doors, windows and louvers openings, below stone coping, and other locations as needed.
   2. Provide end dams at vertical terminations of flashing, refer to section 04000 Masonry.

D. Unsealed penetrations through flashing materials are prohibited.

2.08 ELECTROLYSIS PREVENTION

A. Give all portions of metals which come in contact with masonry or concrete two (2) coats of bituminous paint.

B. When two dissimilar light metals come in contact, paint each contact surface with one (1) coat of bituminous paint.

PART 3 – FIRE BARRIERS

3.01 FIREPROOFING MATERIAL:

A. Fireproofing material shall be cementitious rather than fiber-based.

3.02 FIRESTOPPING:

A. Firestopping materials shall have Underwriters Laboratory (UL) ratings consistent with the rating of the wall or floor system. Comply with ASTM E-814, "Standard Method of Fire Tests of Through Penetration Fire Stops". Penetration details shall be approved by UL or other approval agency and shown on drawings. Expandable polyurethane foam is not acceptable for sealing penetrations through rated assemblies.

END OF SECTION

PART 1 – GENERAL

1.01 EXTENT OF SECTION

A. This section contains the requirements relating to thermal and moisture protection as specifically provided by low slope and steep slope roofing systems that include insulation, roof membranes, membrane flashing, and sheet metal flashing.
   1. The roofing system includes the following basic components: roof deck or substrate, insulation, waterproofing membrane, protective surfacing, flashing, counter flashing, roof cants where applicable, caps and copings, perimeter fascia/gravel stops, sealants, roof expansion and control joints, roof walkway systems, roof hatches, skylights, roof drains, emergency overflow protection, roof drain flashing, scuppers, gutters, downspouts, and ballast material where applicable. These components and all types of roofing material, including tile, are subject to the requirements of this section.

B. The intent of the PCSB STANDARDS is for the DESIGN PROFESSIONAL (DP) to comply with the minimum general project requirements and the specific project specifications shall be generated and provided by the DP.

1.02 REFERENCE STANDARDS AND CODES

A. ROOF DESIGN CODES AND STANDARDS:
   1. Florida Building Code (FBC) and State Requirements for Educational Facilities (SREF), latest editions;
   2. PCSB Design and Construction Standards.

B. ROOF INDUSTRY GUIDELINES**:** All roofing installations shall comply with the following industry resources and guidelines:
   1. *The NRCA Roofing and Waterproofing Manual*, latest edition, published by the National Roofing CONTR Association;
   2. *Architectural Sheet Metal Manual* published by SMACNA (Sheet Metal and Air Conditioning Contractors' National Association, Inc.);
   3. *FM Global RoofNav* (A web-based tool, Factory Mutual Systems Approval Guide);
   4. *Underwriters Laboratory (UL) Building Materials Directory*;
   5. American Institute of Steel Construction (AISC): "Steel Construction Manual";
   6. American Iron and Steel Institute (AISI): "Cold Form Steel Design Manual";
   7. Underwriters Laboratories, Inc. (UL): "Tests for Uplift Resistance of Roof Assemblies";
   8. Underwriters Laboratories, Inc. (UL): "Test Standard For Impact Resistance", Underwriters Laboratories, Inc.;
   9. American Society for Testing and Materials (ASTM) *Annual Book of Standards Volume 4.04 for Roofing, Waterproofing and Bituminous Materials*;
   10. ASTM E 1592-95: "Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference", American Society for Testing and Materials. [# 16 inch wide, 22 gauge only];

11. ASTM E 1646-95: "Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen", American Society for Testing and Materials;
12. ASTM E 331-83: "Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference", American Society for Testing and Materials;
13. ASTM A 792-83-AZ50(Painted) & ASTM A792-83-AZ55(Bare Galvalume Plus®): "Specifications for Steel Sheet, Aluminum-Zinc Alloy Coated (Galvanized) by the Hot Dip Process, General Requirements (Galvalume®)", American Society for Testing and Materials;
14. ASTM E 1514-93: "Standard Specification for Structural Standing Seam Steel Roof Panel Systems", American Society for Testing and Materials;
15. Metal Roofing System Association (technical details);
16. Federal Emergency Management Agency (FEMA), *Guidelines for Buildings to be used as Public Shelters.*

1.03 ROOF SYSTEM'S GENERAL DESIGN

A. DESIGN:
1. Florida Registered DP Required on all new, repair, and replacement roofing projects.
2. Shall have plans and specifications.
3. **Wind Design:** Design roof systems to resist extreme wind forces. Structural analyses are required to verify the integrity of all roof components. Wind uplift design shall comply with the most stringent requirements of applicable codes and the latest edition, ASCE 7, referenced by the latest edition of the FBC.
4. The DP shall specify roof systems and system components that comply with FBC, latest edition, Product Approval or Miami-Dade Notice of Acceptance (NOA) indicating that the system has been satisfactorily tested to resist wind uplift design pressures determined by the project structural engineer. The wind uplift design pressures and the other criteria shall be indicated on the plans according to the FBC.
5. Roof Drainage Design: Florida Plumbing Code, latest edition.
6. EHPA's roof coverings shall comply with latest ASTM and Factory Mutual Standards for materials and wind uplift forces.
7. Provide walk pads around all mechanical equipment and roof hatches.

B. DESIGN DETAILS: All requirements of this Standard and referenced standards shall be strictly adhered to. All penetrations and conditions shall be detailed (including fan bases, power supply, equipment, corners, terminations, drains, scuppers, overflows, edges, flashings and slopes) according to the recommended procedures provided in the latest edition of the National Roofing CONTRACTORs Association (NRCA) Roofing and Waterproofing Manual and installed per Manufacturer's instructions. The details in the Manual show standard conditions that shall be adapted to suit each individual project.

1.04 MANUFACTURERS' AND INSTALLERS' GENERAL REQUIREMENTS

A. **ROOFING INSTALLER QUALIFICATIONS:**

1. All roofing CONTRACTORS working on PCSB facilities shall have a latest State of Florida license and be certified/ approved as roofing CONTRACTOR by the Manufacturer for the system being installed or repaired.
2. Roofing contracting firms shall have a minimum of five (5)-years of experience installing the type of system specified. This experience shall have been earned by the firm proposing the work, not by individual employees.
3. The roofing installer must have a full-time roofing Foreman or Superintendent with a minimum of five (5)-years documented experience installing products specified. An English speaking Foreman shall be present on the job during the application of any warranted roofing products.
4. The roof installer shall provide the PROJECT COORDINATOR with *a two (2)-year Material and Labor Warranty* which covers all work and material installed by the roofing CONTRACTOR or any of his Subcontractors.
5. Prior to bidding, the Roof installer shall be certified by the Roofing Manufacturer as an applicator qualified to install 20-years warranted roof systems.

B. **MATERIALS MANUFACTURER'S REPRESENTATIVE:**

1. The materials manufacturer issuing the final guarantee on this roofing project must have a **full time employee with at least 5 years of field experience in all phases of built up roofing** that lives within a one hundred (100) mile radius of the proposed project. This employee shall serve as a Manufacturer's Representative during the project.
2. The Manufacturer's Representative **cannot** be associated with or work for any distributor or CONTRACTOR, or have any financial association with either of the above listed. Agents or inspectors who represent more than one manufacturer are excluded.
3. Further, the Manufacturer's Representative shall provide in writing (upon request of the PROJECT COORDINATOR) and signed by an **officer of the corporation** complete acceptance of the terms listed not less than seven (7) days prior to the date of the bid. He must also supply the name and phone number of the officer of the corporation who shall be signing the document.
   a. The materials manufacturer's representative shall be required to inspect the work, see this Section 07500- **1.05**, A.5.c and **3.05**, B.5.f, pertaining to number of inspections. The report shall assist in ascertaining the extent to which the materials and procedures conform to the requirements of these specification and to the published instructions of the material manufacturer.
   b. The authorized material manufacturer's field representative shall be responsible for:
      (1) Rendering inspections per the Manufacturer's recommendations and any additional inspections requested by the PROJECT COORDINATOR.
      (2) After each inspection a written report shall be provided to the PROJECT COORDINATOR, as to the progress and quality of the work observed.
      (3) Calling to the attention of the CONTRACTOR those matters observed which he considers them to be in violation of the contract requirements.
      (4) Reporting to the PROJECT COORDINATOR in writing any failure or refusal of the CONTRACTOR to correct unacceptable practices called to his attention.
      (5) Supervise the taking of test cuts and the restoration of such areas.
      (6) Confirming after completion of the work and based on their observations and tests that they have observed no application procedures in conflict with the specifications, other than those that may have been previously reported.

Final payment shall not be released until this confirmation has been received by the PROJECT COORDINATOR.

c. The presence and activities of the material manufacturer's Representative shall in no way relieve the CONTRACTOR of his contractual responsibilities. In the event of a dispute, the PROJECT COORDINATOR shall have final authority.

d. Non-Compliance with the terms of this specification and ensuing contract can result in either the cancellation of the contract, or complete replacement of the defective areas at the CONTRACTOR'S expense. In the event of cancellation, the OWNER shall not be obligated to compensate the CONTRACTOR for any work undertaken. Furthermore, damages caused by water infiltration resulting from the failure of the CONTRACTOR to secure each day's work in a weather tight manner, shall be corrected at the CONTRACTOR'S expense, and included as damages shall be all labor costs incurred by the OWNER as a result of such water infiltration.

C. **MANUFACTURER QUALIFICATIONS**

1. Manufacturer shall have been in business as a Manufacturer for a minimum of fifteen (15)-years making the generic product specified.
2. Manufacturer shall have supplied same or similar products on at least five (5) projects of similar size and scope prior to bidding or the installation of at least 250,000 squares of their roof system.
3. Manufacturer shall provide to the DP written documentation to the above requirements no later than 5 working days prior to the date of bid.
4. Metal roof systems shall have a 20 year finish warranty after date of Substantial Completion.

D. **PROTECTION PLANS:** OWNER shall require a specific protection plan for all new and reroofing projects to describe the means of maintaining the building in a safe and watertight condition throughout the construction period. Existing and newly installed roof systems shall be considered in the protection plan to ensure roofing operations do not damage them. Areas where the roof deck/structure are (or may be) damaged or deteriorated shall only be reroofed when the occupied spaces below are unoccupied. Other potential phases of reroofing operations can be hazardous to the facility and its occupants and shall be carefully reviewed during design bidding and at appropriate phases during construction.

E. **INSPECTIONS, WRITTEN REPORTS, AND TESTING**

1. PRE-CONSTRUCTION CONFERENCES: PCSB shall coordinate a roofing Pre-construction conference for all new and reroofing projects. Participants should include but not limited to: PROJECT COORDINATOR, PCSB Service Manager (assigned to the school), AHJ, DP, CONTRACTOR, Roofing CONTRACTOR, Roofing Manufacturer's representative, and other related trades' representatives.
2. QUALITY CONTROL: The installer shall be certified by the manufacturer and the Manufacturer shall certify the installation on completion.
3. BUILDING COMMISSIONING: OWNER may include the Building Commissioning as part of the project requirements. For certain projects, the Building Commissioning shall include the Building Envelope which includes roofing systems. The project

specifications should have information that outlines the Building Envelope Commissioning requirements.

4. TESTING REQUIREMENTS: Testing may include fastener resistance withdrawal tests for base sheet or rigid insulation fasteners, and compressive strength, unit weight or wet density tests for lightweight insulating concrete. Specifications should indicate test procedures and frequency.
5. ROOF CONSTRUCTION MONITORING REQUIREMENTS:
   a. **Inspector Qualifications:** The inspector shall be knowledgeable in roofing specifications and appropriate installation or repair procedures.
   b. **Inspection Reports:** The inspector shall be required to issue written reports on a daily basis which include, at a minimum: the name, address and phone number of the Roofing Contractor, the name of the roofing foreman/superintendent, description of the day's weather, number of roofers/sheet metal mechanics on project, location of the day's work, description of work accomplished, deficiencies observed in the work requiring correction, a description of materials incorporated into the work and those stored for later use, and a quantitative summary of unit price items incorporated into the day's work.
      1) **Membrane Manufacturer Inspections and Reports:**
         a) FOR BIG ROOFING PROJECTS (size shall be determined by DP and/ or PROJECT COORDINATOR and Roofing CONTRACTOR):
            i. The project specifications shall require that the roof manufacturer representative make a minimum of five (5) inspections, proceeded with written reports. The following inspection shall occur as listed: One (1) inspection at the beginning of the project; three (3) inspection during application; and one (1) inspection at *Substantial Completion.*
            ii. *A written report* from the manufacturer representative shall follow all inspections and provided to the DP and/ or the PROJECT COORDINATOR.
         b) FOR SMALL ROOFING PROJECTS (size shall be determined by the DP and/ or PROJECT COORDINATOR and Roofing CONTRACTOR):
            i. The project specifications shall require that the roof manufacturer representative make a minimum of three 3 inspections, proceeding written reports. The following inspection shall occur as listed: One (1) inspection at the beginning of the project; One (1) inspection during application; and one (1) inspection at *Substantial Completion*.
            ii. A written report from the manufacturer representative shall follow all inspections and provided to the DP and/ or the PROJECT COORDINATOR.
6. UPON COMPLETION: The OWNER reserves the right to perform an **infrared scan of the finished roof,** performed by a PCSB representative. Any defects found shall be the roofing CONTRACTOR'S responsibility to repair, including an additional infrared scan after repairs have been executed, at no additional cost to the OWNER.

F. GUARANTEE AND WARRANTY

1. Upon completion of all work and as a condition of its acceptance, the manufacturer shall deliver to the DP two copies of the membrane manufacturer's roof guarantee covering all work in this section.
2. The warranty is a 20 year – NO DOLLAR LIMIT GUARANTEE (NDL) with two 5 year renewable terms to equal 30 years. There shall be no charge for the guarantee and it shall not be pro-rated. The warranty must be signed by a Corporate Officer of the manufacturer. The manufacturer shall pay for repairs to the built-up roof system necessary to stop leaks which occur during a twenty (20) year period from date of completion. A roof inspection shall be made annually by the manufacturer for duration of the guarantee. Findings shall be submitted in writing to the PROJECT COORDINATOR.
3. Annual inspections shall be provided at no additional cost to the OWNER. As a result of annual inspection any roof repairs or maintenance required to keep the roof in good condition shall be carried out by the PCSB Maintenance with an approved applicator of the roofing manufacturer. The manufacturer shall not be responsible for any damages to the building or its contents or any other consequential damages, and its responsibility is limited to repairing leaks.

PART 2 – ROOF COVERINGS & APPURTENANCES

2.01 LOW SLOPE MEMBRANE SYSTEMS

A. GENERAL:

1. Comply with ASTM D4434 or CGSB37-GP-54M and with manufacturer's installation instructions for all phases of work including substrate preparation, application of materials and protection of adjacent surfaces.
2. FM Listing: Provide sheet membrane, base flashings, and component materials that meet requirements of FM 4450 and FM 4470 as part of a roofing system and that are listed in FM's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM markings.
3. Evaluate condition of existing membrane system using the modified peel test based on ASTM D 903.
4. At OWNER'S discretion, non-destructive testing (Infra-red photography and/or Tramex tool and onsite inspection) shall be performed and verified with actual roof cores. A roof plan shall be made to show all wet areas, which require replacement of wet insulation and damaged membrane.
5. Protection of existing: All existing conduit, cable, support wires, supports, etc., are functioning and in reasonable working condition when the roof is turned over to the CONTRACTOR for this work. They must remain in good working condition at all times. Any item temporarily relocated must be properly placed back in the original position by the roofing CONTRACTOR. Any special disconnection of existing electrical or other services shall be coordinated with the PROJECT COORDINATORS and be carried out by the roofing CONTRACTOR.
6. All projects unless specified shall receive 1-inch minimum perlite concrete roof deck insulation. All loose and protruding gravel must be removed before installing perlite boards. Do not use perlite board under fully adhered single ply systems or with direct torch application of modified bitumen.
7. All base flashing shall extend a minimum of 10-inches from the top of the roof membrane to the top of the base flashing up the vertical sides of curbs, walls, or roof penetrations.

8. Follow NRCA standards and details, pertinent codes and manufacturer's data: where conflict(s) exists, more stringent requirements prevail.
9. Design is based on the use of materials manufactured and/or approved by the selected roofing manufacturer and the terminology used may include reference to proprietary products of that company. Construe such reference as establishing only the quality of workmanship and materials to be provided under this Section and not as limiting competition.
10. Products of other manufacturers may be proposed in accordance with the provisions of the Contract.
11. No Asbestos Containing Materials (ACM) shall be used.
12. Deck replacement – as the restoration progresses deteriorated deck shall be removed and replaced with like kind and quality material.
13. Fasteners which have loosened or backed out shall be removed and replaced.
14. Curling insulation boards shall be refastened flat or replaced.

The CONTRACTOR shall furnish to the OWNER a written guarantee warranting the roofing insulation and flashing work, including the installation of products furnished by others and installed under this Section of the Work, against defects in materials and workmanship for a period of five (5)-years from the Date of Substantial Completion

E. ROOFING MEMBRANE TYPES:
   1. **SINGLE-PLY:** Ethylene Propylene Diene Monomer (EPDM) for restoration or replacement of existing roofing by cleaning surface, treating seams and applying solvent based elastomeric coatings. Must be fully adhered or mechanically attached with covered fasteners. Button systems, surface attached metal track systems and ballasted systems are not recommended per manufacturer's specifications.
      a. Install new EPDM over repair areas per NRCA and original EPDM manufacturer recommendations.
   2. **MODIFIED BITUMINOUS 3-PLY OVER LIGHTWEIGHT INSULATING CONCRETE FILL:** Roof membrane system consisting of a minimum of a three (3)-ply modified bitumen membrane system (one mechanically fastened base sheet, one modified bituminous inter-ply sheet, and one modified bituminous cap sheet). Cap sheet shall have a white granular or white reflective surfacing. The following application methods may be used:
      a. Hot mopped asphalt (approval on case by case basis);
      b. No coal tar pitch, only asphaltic compounds for BUR, unless approved by the PROJECT COORDINATOR.
      c. Torch application;
      d. Cold adhesive or cold process.
   3. **MODIFIED BITUMINOUS 3-PLY OVER RIGID INSULATION:** Roof membrane system consisting of a minimum of a three-ply modified bitumen membrane system (one base sheet adhered to a cover board, one modified bituminous inter-ply sheets, and one modified bituminous cap sheet). Cap sheet shall have a white granular or white reflective surfacing. The following application methods may be used:
      a. Hot mopped asphalt (approval on case by case basis)
      b. Torch application
      c. Cold adhesive or cold process.

4. **BUILT UP ROOF – HOT MOPPED ASPHALT:** Three plies of Type IV glass fiber felts may be applied directly to a mechanically fastened base sheet or a rigid insulation cover board with hot mopped asphalt. Cap sheet shall have a white granular or white reflective surfacing. Two ply base flashing is a part of the membrane and shall match the cap sheet membrane material.
5. **HOT MOPPED ASPHALT APPLICATION:** Due to issues associated with hot asphalt kettles and fumes, the use of hot mopped asphalt systems is discouraged and must be approved by the PROJECT COORDINATOR on a case by case basis.
6. **TORCH APPLICATION:** Torch application of roofing and flashing materials requires the use of a fire watchman and roofing CONTRACTOR employees who are latest certified under the NRCA / MRCA CERTA (Certified Roof Torch Applicator) Program.
7. TEMPORARY DRY IN MEMBRANE: If necessary when reroofing, a “dry-in” membrane of two plies of Type IV or Type VI glass fiber felts may be applied directly to a primed structural concrete deck or other suitable substrate to keep the building dried in. Decks exposed to weather over occupied spaces are prohibited.
8. **AGGREGATE SURFACING:** The use of gravel or slag surfacing or loose stone ballast is discouraged. On a case by case basis, if used must be approved by the PROJECT COORDINATOR.
9. **ALTERNATIVE ROOF SYSTEMS:** If the DP proposes a specific alternative roof system, e.g. a unique or non-traditional system, the request to install an alternative roof system shall be in writing and include justification data. Written approval from the PROJECT COORDINATOR shall be obtained prior to using an alternative system.

2.02 STEEP SLOPE ROOF SYSTEMS

A. GENERAL STEEP SLOPE ROOFING
   1. Materials includes shingle, slate, tile and metal roof systems.
   2. Steep slope roofing shall not be used with roof slopes of less than four (4) inches per foot unless a self-adhered modified bituminous waterproof underlayment system is installed beneath the steep roofing components.
   3. Under no circumstances, shall slate or tile be installed on roofs with slopes of less than two (2) inches per foot.

B. STEEP SLOPE ROOFING TYPES:
   1. **CLAY TILE ROOFS**: Tile shall be flat slab clay tile. Size, shape and edges shall match existing where possible. Tile shall meet Grade 1 requirements of ASTM C1167, latest edition. Installation shall be based on the Concrete and Clay Roof Tile Installation Manual published by the Florida Roofing, Sheet Metal, and Air Conditioning CONTRACTORs Association, Inc. (FRSA) and the Tile Roofing institute (TRI).

2. **EXISTING CLAY ROOF TILE**: PCSB may require the salvage of any unneeded and unbroken clay roofing tile, having it neatly stored on pallets and delivered to the warehouse storage yard.
3. **METAL ROOFS**:
   a. DESIGN REQUIREMENTS: For all metal roofing, fascia and soffit systems, and associated trim/flashings, CONTRACTOR/ manufacturer/ supplier shall supply an engineered layout of all required fasteners and connection details. Shop drawings shall be signed by a Florida Registered DP to certify that fastenings shall safely resist design wind loads in compliance with the FBC, latest edition adopted by D.O.E. and ASCE-7, latest edition adopted by D.O.E. Certification to apply to all panels, flashing and accessories.
      1) All metal roof systems shall be constructed of solid aluminum or Galvalume panels.
      2) All panel finishes shall be a premium fluorocarbon coating produced with Kynar 500.
      3) Metal roofs shall have true standing seams with concealed clips and fasteners and a high performance (premium fluorocarbon) coating.
      4) The use of panels with exposed fasteners is discouraged. Design and construction of longer panels must accommodate expansion and contraction.
      5) Flashings shall be isolated from copper flashings required by other sections.
      6) Rubber boots shall be installed over vent stacks.
      7) Metal retrofit systems installed over existing low slope roofs shall have a solid substrate with a waterproofing membrane applied.
      8) Provide for air flow beneath metal panels to prevent condensation.
      9) If any portion of an existing metal roof is removed than replaced, the installer must be a certified installer through the manufacturer.
      10) **Warranty(s)**: Metal roof system manufacturer, upon final acceptance for project, shall furnish a warranty for listed below items:
         i. **Covering Bare Metal** against rupture, structural failure and perforation due to normal atmospheric corrosion exposure for a period of 20 years.
         ii. **Covering Panel Finish** against cracking, checking, blistering, peeling, flaking, chipping, chalking and fading for a period of twenty (20) years for wall panels and twenty (20) years for roof panels (premium fluorocarbon coating produced with Kynar 500.
         iii) **Contractor's Installation**: shall provide a two (2) year installation warranty for all roof panels, clips, curbs, flashing, etc.
      11) **Weather-tightness Warranty**: The Contractor shall provide to the PROJECT COORDINATOR, a single source warranty signed by the roofing manufacturer of the Standing Seam Roof System as outlined below:
         i. For a period of twenty (20) years from the date of substantial completion, the roofing manufacturer WARRANTS to the PROJECT COORDINATOR that the roofing manufacturer's furnished roof panels, flashing, and related items used to fasten the roof panels and flashing to the roof structure ("Roof System") shall not allow intrusion of water from the exterior of the roofing manufacturer's Roof System into the building envelope, when exposed to ordinary weather conditions and ordinary

wear and usage. The Date of substantial completion is the date that is certified by the DP and/ or PROJECT COORDINATOR when the roofing manufacturer's Roofing System is completed and accepted by the PROJECT COORDINATOR.

12) **Roofing Installer Qualifications** shall be an approved installer, certified by the manufacturer within one year of the beginning of installation of the metal roof system.
    i. Maintain $250,000 minimum general liability insurance coverage.
    ii. Maintain statutory limits of worker's compensation coverage as mandated by law.
    iii. Has no viable claims pending regarding negligent acts or defective workmanship on previously performed or current projects.
    iv. Has not filed for protection from creditors under any state or federal insolvency or debtor relief statutes or codes.
    v. Project foreman is the person who speaks English, having a minimum of 10 years' experience in the proper installation of the specified metal roof system and shall be present to supervise whenever material is being installed.
13) **Metal Roof System Fabrication Certification**
    i. Submit a letter from the metal roof system manufacturer certifying the roof panels have been produced in a factory environment (not job site roll formed) with fixed-base roll forming equipment.
14) **Manufacturer Has a Minimum of Three (3)-Years' Experience in manufacturing** metal roof systems of this nature.
    i. Panels specified in this section shall be produced in a factory environment (not job site roll formed) with fixed-base roll forming equipment assuring the highest level of quality control.
    ii. A Letter from The Manufacturer Certifying Compliance shall accompany the product material submittals.
15) **Installation Contractor's Qualifications**
    i. Submit certificate from manufacturer certifying that installer of the metal roof system is an authorized installer certified by the manufacturer.
    ii. Submit five references from five different DPs or PROJECT COORDINATORs for projects that have been in service for a minimum of two years, stating satisfactory performance by the installation contractor.
    iii. PRE-INSTALLATION CONFERENCE
        a) Prior to installation of roofing system, CONTRACTOR shall conduct a pre-installation conference at the project site.
        b) Attendance: PROJECT COORDINATOR, DP, Contractor, Project Superintendent, and Roof Applicator.
        c) Schedule:
            i) Roofing details and scheduling.
            ii) Critical work sequencing and review of phasing plan.
            iii) Inspection sequencing.
16) **Field Quality Control**

i. During installation, provide for three (3) on-site inspections of roof application by a qualified technical representative of the manufacturer.
ii. Upon completion of installation, provide a final inspection by a technical representative of roofing manufacturer to confirm that roofing system has been installed in accordance with manufacturer's requirements, provide written and photographic evidence.

C. **ASPHALT SHINGLES/ ARCHITECTURAL SHINGLE ROOFS:** General: comply with instructions and recommendations of shingle manufacturer, except to extent more stringent requirements are indicated.
1. PERMANENT BUILDINGS:
   a. Provide dimensional architectural shingles.
      1) 40 Year warranty, 300 lbs./square (minimum), heavyweight, mineral surfaced, self-sealing, laminated asphalt fiberglass construction complying with ASTM D 3018, Type 1 and ASTM D 3462. Provide shingles bearing UL Class "A" external fire exposure label, UL "Wind Resistant" label and Fungus Guard. Color shall be selected from manufacturer's standard colors as approved by OWNER.
   b. Approved manufacturers and shingle style are as follows:
      1) CertainTeed -"XT25"
      2) GAF -"Royal Sovereign"
      3) Owens Corning -"Supreme AR"
      4) Alternate submittals must meet or exceed the above listed manufacturers and shall be approved by the PROJECT COORDINATOR.
   c. Underlayment for Permanent Structures- Apply one layer of self-adhering Viking UDL shingle HG underlayment horizontally over entire surface. Use a 4-inches minimum lap on successive coursing. Install shingle within 7 days of placement.
2. RELOCATABLES
   a. Provide 3-tab shingle.
   b. 25 Year warranty, 235 lbs./square (minimum), fiber glass-based asphalt construction complying with ASTM Specifications: E108 Class A, D 3161, 3018 Type 1, D 228 and ASTM D 3462. Provide 3-tab shingles bearing UL 790, Class A Fire Resistance and UL 997, Wind Resistance and Fungus Guard. Color shall be selected from manufacturer's standard colors as approved by OWNER.
   c. Approved manufacturers and shingle style are as follows:
      i. CertainTeed -"XT25"
      ii. GAF -"Royal Sovereign"
      iii. Owens Corning -"Supreme AR"
      iv. Alternate submittals must meet or exceed the above listed manufacturers specifications and shall be approved by the PROJECT COORDINATOR.
   d. Underlayment for Portables-
      1) Apply one layer of No. 30 felt (or as recommended by asphalt shingle manufacturer) horizontally over entire surface, lapping succeeding courses 2-inches minimum and fastening with sufficient nails to hold in place until shingle application. Install shingles before seven (7) days are up.
      2) Fasten metal drip edge along the bottom edge (eaves) before felt is laid and to the sides (rakes) after felt is laid.
      3) End laps of felt to be 4-inches minimum infield of roof and 6-inches from both

sides of hips and ridges. No shingles are to be installed until metal flashing is installed.

3. EDGE DRIP AND RAKE TRIM: fabricated from 22 gauge sheet.
   a. Secure top flange with galvanized roofing nails, near the back edge, at 8-inches o.c.
   b. At drip edge, space end-to-end joints ¼-inches. Provide 6-inches long matching and overlapping covers for each joint. Secure with one nail in ¼-inches gap and embed fully in mastic.
   c. At rake conditions overlap flashing minimum 8-inches with up slope members on top of lower member, with laps set in mastic.
4. SHINGLES:
   a. Install starter strip of inverted shingles with tabs removed. Fasten shingles in pattern, weather exposure **with six (6) nails per shingle. No staple guns will be allowed**. Only USA manufactured nails shall be accepted. Shingles shall be installed such that ends are staggered in the following manner:
      1) The first course is to begin with a full length shingle.
      2) The second course is to begin with a full length shingle minus 6-inches.
      3) The third course is to begin with a full length shingle minus 12-inches.
      4) The fourth course is to begin with a full length shingle.
         (Then repeat process as installation progresses up the roof.)
      5) Use horizontal and vertical chalk lines to ensure straight coursing. Comply with installation details and recommendations of shingle manufacturer and NRCA Steep Roofing Manual.
      6) The maximum exposure for shingles shall be 5-inches which include hip and ridge caps.
      7) Modified Bitumen Sheet Flashing
         a) #25340 Viking UDL shingle HG underlayment – 2 sqs/rl or as approved.
5. OFF-RIDGE VENT: install off-ridge vent at locations shown on drawings. Conform to manufacturer's installation instructions. Set flanges of vent in roofing cement. Off-ridge vent shall be .040 aluminum metal.
6. FLASHING: Install metal flashing, vent flashing and edge protection as indicated and in compliance with details and recommendations of the NRCA Steep Roofing Manual.
7. RIDGE/HIP CAP SHINGLE: manufacturer’s standard pre-manufactured product to match typical shingles.
8. Use .040 mil finish aluminum metal standing seam flashing in all valleys for replacement of valley metal.

2.03 FUME RECOVERY SYSTEMS

A. GENERAL

1. **Laboratory Fume Hood Policy:** All work on roof tops with fume hood exhausts shall be in compliance with these Standards, FBC, and/ or other Reference Standards. The DP shall consult with PROJECT COORDINATOR to determine what substances of the existing roof mounted laboratory hood exhaust stacks are discharging and then the DP shall specify in the project construction documents what protective measures must be undertaken by the CONTRACTOR and their sub-contractors to protect their workers.
2. References
   a. Products used in this section shall conform to specification as listed in the latest edition of the following:

1) ASHRAE – Testing Methods (American Society of heating, Refrigeration, Air Conditioning Engineers).
2) OSHA – CTPV's Concentration in Air OSHA (Occupational Safety & Health Administration). CTPV's (Coal Tar PitchVolatiles) As the Benzene Soluble Fraction of total Particulate.

3. Provide and utilize a Fume-guard System as specified herein, as required to reduce bitumen fuming and odor to the limits stated herein including but not limited to:
   a. Roofing.
   b. Heating of Bituminous Materials.

B. EQUIPMENT
1. Minimum equipment requirements have been listed. All of these products to be used and bid.
   a. Provide a separate line item in unit cost section.
   b. Approved equipment is a complete Fume-guard System by Garlock Equipment Co. Minneapolis, MN or approved substitution.
      1) Fume-guard System consists of: portable thermal converter cabinet, 6-in. diameter x 10-ft. flex hose, loading door and split hood assembly, 15-ft. LP vapor hose with regulator gauge.

C. FUME RECOVERY UNIT
1. Unit to be equipped to remove fumes and objectionable odors such as: petroleum oils, VOC's, sulfur residue, particulates, etc.
2. Combustion device for fume reduction shall be external to and independent of the primary bitumen heating device (kettle/ tanker) and shall be ducted away from the primary heating device by means of a 6-in. flex hose no less than 10-ft. in length. Fume reduction device shall be fueled by vapor LP only.
3. Fume reduction system shall be capable of reductions of emissions of hydrocarbons and particulates at an efficiency level of 99% or greater.
4. EXECUTION
   a. Operation of the Fume-guard system shall in every way conform to the written instruction and/or operator instructions.
   b. Operator shall be thoroughly trained and familiar with the function, design, performance operation and maintenance of the Fume-guard System equipment.
   c. Fume-guard System shall be operating at all times while heating bitumen.
   d. Fume-guard shall be maintained at all times in accordance with manufacturer's instructions.
   e. Intakes shall be positioned so that no fume loss occurs at source.
   f. Fume-guard System shall be positioned so that no obstruction or air flow restriction exists either at the intake or exhaust port.
   g. Temperature of Fume-guard System shall be maintained in accordance with manufacturer's instructions.

E. ROOF INSULATION
1. GENERAL ROOFING REQUIREMENTS: Generally, the roof system designs for these facilities shall require reflective surfacing materials which comply with Energy Star guidelines.

2. ENERGY MANAGEMENT: Roof system design shall be consistent with Energy Management requirements and the Florida Statutes and applicable Codes. Insulating values of the finished roof system shall be designed on the basis of economic life cycle return on investment when evaluated against fuel costs.
3. INSULATION REQUIREMENTS: Insulation materials shall comply with the FBC and ASHRAE 90.1. Additional insulation or improved thermal performance materials and systems may be required to achieve energy efficiency goals associated with International Green Construction Code (IgCC) requirements, latest edition.
4. MINIMUM SLOPE: A minimum final slope of ¼ -inch per foot shall be required on all new roof systems. The roof surface shall have positive slope with no ponding. Areas exhibiting ponding shall be reworked, not merely have the number of plies increased.
5. TEMPORARY ROOFS: Temporary roofs may be left in place under the roof insulation, where practical.
6. LIGHTWEIGHT INSULATING CONCRETE:
   a. Pan shall be filled with *Lightweight Insulating Concrete*, an aggregate base, and have a minimum compressive strength of 300 PSI.
   b. Applicable Standards: All lightweight insulating concrete systems shall meet the following standards:
   c. Latest Florida Building Code Product Approval (or Miami-Dade Notice of Acceptance (NOA)) indicating that the system has been satisfactorily tested for wind uplift design pressures determined by the project structural engineer.
   d. Tested by Underwriters Laboratories in accordance with the procedures of ASTM E-119 and listed in the most recent Underwriters Laboratories Fire Resistance Directory.
   e. Tested by Factory Mutual Research and listed in the most recent Factory Mutual Approval Guide as non-combustible or Class 1.
   f. Tested by Factory Mutual Research for windstorm classification I-120 and listed in the most recent Factory Mutual Approval Guide.
7. VENTILATION OF LIGHTWEIGHT INSULATING CONCRETE: If lightweight insulating concrete is installed over slotted or perforated galvanized steel roof deck, additional ventilation may not be required. If lightweight insulating concrete is installed over a non-ventilated deck like structural concrete, non-slotted metal deck or over existing roof assemblies, temporary membranes or vapor barriers, additional ventilation is required. If one-way vents are used to provide additional ventilation, they must be insulated, spun aluminum roof vents having a one-way valve design. The vents must be furnished by roofing material Manufacturer and specifically included in the Manufacturer's warranty. Roof vents constructed of PVC are not acceptable.
8. RIGID INSULATION:
   a. Rigid thermal insulation shall consist of foam insulation with high R-value as required by code min. or DP's design and meets both FM 4450 and UL 1256. For hot mop applied or torch applied built up roof or modified bituminous systems, a cover board, e.g. DensDeck, must be used over foam insulation.
   b. Provide tapered insulation and crickets to develop proper roof slope.
   c. Do not mop rigid insulation directly to wood decks. Provide mechanically fastened base sheets over rosin paper.

F. SHEET METAL FLASHING AND TRIM

1. ROOF TERMINATION PENETRATIONS AND FLASHING DETAILS shall be based in part by standard details prepared by SMACNA and NRCA. Construction documents shall include project specific details and fastener requirements.
2. ACCEPTABLE MATERIALS AND MINIMUM THICKNESS:
   a. Copper, 16- ounce.
   b. Aluminum with factory applied finish coating, 0.040-inch.
   c. Stainless Steel, 26-gage.
   d. Lead flashing, 4-pound.
3. Galvanized metal is prohibited.
4. Flashings shall always be separated from dissimilar metals to avoid electrolysis.
5 For buildings with steep slope tile roofs in the historic district, copper is required for all exposed flashing, gutters and downspouts.

2.04 ROOF DETAILING AND SHEET METAL FABRICATIONS:

A. GUTTERS: Gutters shall be sized based on drainage calculations. At a minimum, the width shall be 6-inches, with anchors 16-inches on center and slope $^{1}/_{8}$-inch per foot. Long gutter lengths shall have expansion joints. Internal gutters are prohibited on new facilities. Internal gutters on existing facilities shall be eliminated during reroofing or renovation projects to the extent practicable.

B. DOWNSPOUTS: Rectangular shaped downspouts shall be sized based on drainage calculations. Mount at least 1-inch out from the building wall. Provide brass or stainless steel hardware cloth strainers at the top and splash blocks or underground drainage at the bottom. Water from downspouts shall not be directed into the roof drainage system except through roof drains. Provide access to allow for cleaning of downspout/underground connection.

C. ROOF EXPANSION JOINT COVERS**:** Roof expansion shall be carefully considered, especially in membrane roofs. Locate membrane joints above plane of roof, with copper or stainless steel expansion cover instead of bellows type covers. Detail termination of expansion joints carefully. Structural expansion joints occurring in new construction shall be located at high points in the structure or roof insulation to the maximum extent practicable to allow water to flow away from them on the roof surface. Under no circumstances are expansion joints to be placed such that roof water must flow across them to reach drains.

D. THROUGH-WALL FLASHING, see also 07000.
   1. COUNTER FLASHING**:** Counter flashing shall be two-piece with the receiver built into the wall. Stop the wall finish above the counter flashing receiver. Existing buildings may require the reglet to be cut into existing wall construction. Where surface mounted flashings are necessary install a double flashing, both complete, one installed above the other. The top flashing protects the bottom.
   2. PARAPET WALLS: Cap all parapet walls with aluminum or copper coping. Coping shall have either covers and pans, or standing seams. All joints shall be soldered except for planned expansion joints designed to SMACNA standards. Stone coping

may be used to match existing or adjacent architecture, but shall have continuous through wall flashing below it. Built-in flashing with cap and receiver is required. Consideration shall be given to the flow of water around and through parapet walls, especially masonry walls. Waterproof the roof side of parapet wall to preclude excessive weathering or leakage.

E. PITCH POCKETS**:** Metal formed pitch pockets or pitch pans may be used when re-roofing, including those filled with bituminous materials, urethane, butyl rubber, or similar pourable sealer. Alternate materials including cast urethane curbs with pourable sealers or urethane coatings with reinforcing fabrics may be used provided they are installed according to the Manufacturer's written recommendations and specifically included in the roof membrane Manufacturer's warranty.

2.05 ROOF DRAINS

A. ROOF DRAINS: Roof drains shall be factory painted cast iron drains assemblies with painted cast iron strainers. Drains shall be installed with factory furnished clamping rings and set in sumps below the surrounding roof level and tied to underground storm water drains.

B. EMERGENCY OVERFLOW PROTECTION: All flat and low slope roof systems shall have a secondary means of evacuating water from the surface of the roof in the event the primary drainage system is blocked. The secondary system shall be totally independent of the primary system and may consist of overflow scuppers through walls, an independent internal overflow drainage system, or other suitable means. The structural components of a roof system shall be reviewed by a licensed professional structural engineer to ensure that any water that accumulates on a roof system in the event of failure of the primary system shall not overstress the structure. Water shall not be allowed to accumulate to a depth greater than allowed by the applicable building code. Overflow drains, when used, shall be equipped with an appropriate strainer, and should be located approximately within 4-feet of primary roof drains.
   1. INTERNAL GUTTERS: Internal gutters are prohibited on new facilities. Internal gutters on existing facilities shall be eliminated during reroofing projects to the extent practical.

2.06 MISCELLANEOUS ROOF COMPONENTS

A. ROOF ACCESS: All roof areas not accessible, where equipment and appliances requiring access are installed on roofs or elevated structures at a height exceeding 16 feet, by "high reach" man-lift equipment shall be permanently equipped with a reasonable means of access for purposes of maintenance of the roof system and any roof-mounted equipment. Provide non-public interior access to all roof areas.
   1. In one- or two-story buildings, provide roof hatches with ladders located in separate closets; do not install in offices, classrooms or other publicly accessible spaces.

B. EXTERIOR BUILT-IN LADDERS from main roof may be used to provide access to remote roof areas. Roof access to any roof area via a built-in ladder from the ground outside the building is prohibited.

C. ACCESS DOOR THRESHOLDS**:** Access door thresholds to the roof or roof hatches shall be 12-inches above the adjacent roof surface. An acceptable walking surface shall be installed immediately outside the access door threshold on the roof system;

D. WALK PADS: Provide walk pads from roof access, if applicable, to all roof-mounted equipment. Pads shall extend around each piece of equipment, wide enough for workmen to lay out tools and work. Pads shall be compatible with the roof membrane systems;

E. ROOF HATCHES: Roof hatch covers shall be prefabricated, installed on curbs approximately 12-inches above the surface of the roof membrane and lockable.

F. ROOF-MOUNTED EQUIPMENT: Roof-mounted equipment is not acceptable if other locations for placement can be found. All roof-mounted equipment shall be provided with roof surface walkway access rated for the heaviest piece of removable equipment to allow ease of maintenance and minimize roof surface damage. If necessitated by design, roof-mounted equipment shall be consolidated to minimize number of curbed areas. Roof mounted equipment in excess of 50 pounds shall have a means of removal (e.g. elevator rated for the heaviest piece of equipment or a davit assembly.
   1. All roof-mounted equipment when approved, including skylights, shall be set on curbs, and attached to resist area wind loads. Flat skylights are not allowed. Skylights are strongly discouraged.
   2. Roof-mounted antennae and satellite/ cellular dishes, lightning protection anchorage, lab equipment and exhaust fans, or scientific devices shall be located in areas specifically designed for that purpose. Roof loads, walking surfaces, anchoring devices, mounting pads, equipment stands, curbs, or utility needs shall be designed and provided using appropriate details, adapted as required, from the NRCA Roofing and Waterproofing Manual. The number of roof penetrations shall be kept to a minimum.
   3. **Utility Supply Lines**: Utility supply lines (electrical, water, gas, etc.) to roof-mounted equipment shall be installed within the supporting curb of that equipment to the extent practical.
   4. **Condensate Drain Lines**: Drain lines for roof top air conditioning units shall be supported per DP's design documents and routed to internal roof drains, not to scupper drains or other drains that discharge above grade.
   5. **Lightning Protection System**: Lightning air terminals, cables and accessories shall not be attached to or penetrate the base flashing.
   6. **Cants**: Four-inch pressure treated wood cants shall be required around all vertical interruptions of the roof system, such as curbs or walls. In certain circumstances, fiber cants are permitted with PROJECT COORDINATOR's approval.
   7. **Splash Blocks**: At locations where downspouts have been approved to not tie into storm drains, form and pour new concrete pads of 2-ft. by 2-ft. in size at the base of each downspout. Precast concrete splash blocks may be acceptable.

8. **Roof Hatch**: Shall be a 30-inches by 36-inches insulated aluminum mill finish with an opaque hatch lid and a ladder-assist post extending to 42-inches above hatch curb. Furnish complete with curb counter-flashing, cover, compensating spring hinges, lifting handles, automatic lock bar, spring latch and padlock lug. Provide minimum 1 inch insulation on cover and curb.

2.07 REROOFING EXISTING BUILDINGS

A. A. With an existing functioning building where equipment and personnel are working inside, it is imperative that the CONTRACTOR not allow water intrusion into the building during construction through this operation.
   1. Coordinate the work so that no more existing roof is torn off than can be replaced in that workday. Construct a water cut-off at the intersection of the old and new roof areas.

B. Keep the PROJECT COORDINATOR apprised of any unusual existing conditions. Examples of unusual conditions would be exceptionally wet area and deteriorated insulating concrete, rotted nailers, damaged roof drains or other accessories. The objective is to do thorough and complete reroofing.

C. CONTRACTOR shall stock the roof building with no more material than can be used that day.

D. PHASE ROOFING is *prohibited*.

E. WHEN REPLACEMENT OF AN EXISTING ROOF IS REQUIRED, criteria for the replacement roof design for wind uplift, drainage, and thermal insulation shall be in full compliance with these PCSB Standards, FBC latest ed., including but not limited to Reference Standards to the extent where practical. Reroofing projects shall improve existing conditions without degrading the performance of surrounding construction (especially masonry weeps):
   1. **Asbestos Surveys:** Before any demolition begins, Asbestos Surveys shall be required as per (40 CFR 61.165.a.4) in 40 CFR 61 subpart M, appendix A for roofing removal operations provided by the PROJECT COORDINATOR.
   2. **Test Cuts/ Core Tests:** Roof replacement designs require core test cuts to determine the composition of the existing roofing and insulation assembly. Fastener pull tests may need to be performed before a replacement roof is designed. Sampling and testing of suspect asbestos containing roofing and flashing materials may be required.
   3. **Slope for Drainage:** On existing roofs where it is impractical to attain the required ¼-inch slope, a minimum slope of ⅛-inch per foot may be permitted with prior written approval from PROJECT COORDINATOR, if other provisions are made to ensure that the integrity of the roof and drainage systems are maintained. Built-up roofs constructed with only asphaltic compounds for BUR.

F. INSPECTION REPORTS: The inspector shall be required to issue written reports on a daily basis which include, at a minimum: the name, address and phone number of the Roofing Contractor, the name of the roofing foreman/superintendent, description of the

day's weather, number of roofers/sheet metal mechanics on project, location of the day's work, description of work accomplished, deficiencies observed in the work requiring corrections, a description of materials incorporated into the work and those stored for later use, and a quantitative summary of unit price items incorporated into the day's work.

1. Manufacturer Inspections and Reports requirements see also **this Section Part – 1, 1.04.E.5.**

G. Components shall be investigated for compatibility with the proposed reroofing system. The following items should include but is not limited to:

1. Parapets and curbs,
2. Roof mounted equipment and roof accessories,
3. Steel decking,
4. Structural framing,
5. Air space if any requirements,
6. Ceiling,
7. Interior conditions and use,
8. Core cuts shall be taken by PROJECT COORDINATOR. Information shall be provided at the pre-bid conference upon request. If any of these elements present a problem, contact the PROJECT COORDINATOR at once prior to the bid opening.

PART 3 – EXECUTION

3.01 GENERAL:

A. Generally, all PCSB facilities should be considered to be occupied and must be protected from moisture intrusion during reroofing operations. Provide protection for interior spaces, furnishings and equipment.

B. In the absence of prior active reported roof leaks, any leakage from the roof area into the building during reroofing projects shall be assumed to be the responsibility of the CONTRACTOR.

C. Before any demolition and renovations begins, Asbestos Surveys shall be required as per (40 CFR 61.165.a.4) in 40 CFR 61 subpart M, appendix A for roofing removal operations.

D. Prior to starting work of the project, the CONTRACTOR shall verify that all roof drains are working. Report any blockages to the PROJECT COORDINATOR prior to beginning work. Report all broken and missing roof drain part such as clamping rings, bolts, and drain strainers.

E. Do not allow water build-up on roof due to changed drainage patterns. Provide for roof drainage during reroofing, either by direct drainage to roof drains or pumps. Do not discharge water from roof directly to grade without specific authorization from the PROJECT COORDINATOR.

F. Existing lightning protection systems shall be carefully removed prior to reroofing. After the lightning protection systems are reinstalled, they must be recertified to comply with the Florida Building Code criteria for Education Facilities.

G. To prevent the entrance of odors into building air intakes, kettles or tar pots shall be located remotely from building air intakes, have their odors exhausted to another location, or be filtered to remove the odors. Hot mopping near building fresh air intakes may require temporarily closing the intakes in the vicinity of the work. Such closures shall be coordinated with the building occupants through the PROJECT COORDINATOR. Whatever measures are necessary to prevent fumes from entering the building must be employed. The use of tankers for asphalt, torch-down applications or cold application methods does not relieve the CONTRACTOR of this responsibility.

H. The CONTRACTOR shall be present at the job site during and immediately after heavy rains in order to identify and repair leaks, clean up water, and repair water damage. Immediately remove water from interior spaces and to wet-vac and clean areas in order for the occupants to proceed with their daily duties without interruption or inconvenience. Storage areas, mechanical rooms and unoccupied areas shall be cleaned and repaired same as occupied areas. Proceed immediately with clean up as soon as discovered; do not wait for the proceeding week to do this work.

I. The CONTRACTOR shall walk the school each morning with administration in the area where work was done the previous day to verify no damage occurred from the previous day's work.

J. The CONTRACTOR shall be aware that any expenditure by PROJECT COORDINATOR to repair or stop leaks, or provide custodial services shall be charged to the CONTRACTOR.

K. Promptly repair all damage to OWNER'S property, including vegetation and irrigation systems. It is the CONTRACTOR's responsibility to identify areas with subsurface irrigation and utility systems.

L. ASBESTOS CONTAINING MATERIALS (ACM)
   1. Prohibit the use of roofing and flashing materials containing asbestos for the installation of new or repair work.

3.02 REMOVAL REQUIREMENTS

A. The removal of old roofing material shall not proceed until it is known whether it contains asbestos and where applicable the removal of roofing containing asbestos shall be carried out by State Certified Roofing Contractor.

B. Asbestos roofing removal shall be conducted in accordance with all requirements of Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), Florida Statutes; and all applicable rules of the Department of Business and Professional Regulation (DBPR), Department of Environmental Protection (DEP), Department of Labor and Employment Security (DLES), or other federal, state, or local AHJ.

3.03 INSPECTIONS, WRITTEN REPORTS, AND TESTING

A. EXISTING ROOF WARRANTIES: Any new work on or through a warranted roof shall be done with the knowledge and permission of the warranty holder.

B. QUALITY CONTROL
   1. **Pre-Construction Conferences**: PCSB shall coordinate a roofing Pre-construction conference for all new and reroofing projects. Participants should include but not limited to: PROJECT COORDINATOR, PCSB Service Manager (assigned to the school), PCSB Inspector, AHJ, DP, CONTRACTOR, Roofing Manufacturer's representative, and other related trades' representatives.
   2. **Quality Control**: The installer shall be certified by the manufacturer and the Manufacturer shall certify the installation on completion.
   3. **Building Commissioning**: OWNER may include the Building Commissioning as part of the project requirements. For certain projects, the Building Commissioning shall include the Building Envelope which includes roofing systems. The project specifications should have information that outlines the Building Envelope Commissioning requirements.
   4. **Testing Requirements**: Testing may include fastener resistance withdrawal tests for base sheet or rigid insulation fasteners, and compressive strength, unit weight or wet density tests for lightweight insulating concrete. Specifications should indicate test procedures and frequency.
   5. **Monitoring Requirements**: For other Manufacturer Inspections and Reports requirements see **this Section Part – 1, 1.04.E.5.**

C. UPON COMPLETION, the OWNER reserves the right to perform an **infrared scan of the finished roof,** performed by a PCSB representative. Any defects found shall be the roofing CONTRACTOR'S responsibility of all necessary repairs including an additional infrared scan after repairs have been executed at no additional cost to the OWNER.

END OF SECTION

PART 1 – GENERAL

1.01 EXTENT OF SECTION

A. This section contains PCSB requirements for interior/ exterior caulking, control and expansion joints.

B. The intent of the PCSB STANDARDS is for the DESIGN PROFESSIONAL (DP) to comply with the minimum general project requirements and the specific project specifications shall be generated and provided by the DP.

C. RELATED DOCUMENTS: Conform to Division 1, Section 07000 and other sections of this division.

PART 2 – PRODUCTS

2.01 EXTERIOR BACKER

A. Closed cell continuous strip sponge neoprene rubber, "Williams EVERPLASTIC Panel Seals" produced by Williams Products, Inc., 1750 Maplelawn Road, Troy, Michigan 48084; or approved equal. Use #5 profile for concrete joint widths $^5/_8$" and larger and #13 profile for joint widths less than $^5/_8$".

2.02 INTERIOR BACKER

A. Braided soft white cotton rope cording.

2.03 PRIMER

A. Product made by manufacturer of Thiokol-Based Caulking Compound.

2.04 EXTERIOR CAULKING

A. “Tremco Dymeric” multi-part urethane sealant or approved equal by Pecora or Sika Chemical.

1. Color(s) will be selected for location to match adjoining materials.

2.05 INTERIOR CAULKING (GENERAL USE)

A. Synthetic acrylic base, "Tremco Mono 555", or as approved.

1. Use 2.4 material at all thru-wall masonry control joints.

2.06 INTERIOR FLOOR JOINTS

A. Two part epoxy joint compound, “Master Builders” Brutem 93, or as approved, for exposed joints in concrete slabs.

B. “Tremco THC-901" for control joints in ceramic/quarry tile floors.

2.07 MASONRY WALL CONTROL/EXPANSION JOINTS

A. Double Wythe Masonry Cavity Wall.
   1. Install sealant with backer on interior and exterior face of inner wythe and exterior face of exterior wythe veneer.

B. Single Wythe Masonry Wall.
   1. Install sealant with backer on interior and exterior face of wythe.

C. Joint Sealant:
   1. Unless otherwise required for specialized conditions, joint sealant shall be a moisture-cured, single- or multi-component (depending on the application and required expansion/contraction capabilities), polyurethane-base, non-sag, elastomeric sealant.
   2. Sealant depth-to-width ratio at the center of the joint shall be 1:2.
   3. Allowable expansion/contraction of the joint shall be ± 25 - 50% of joint width, depending on the product capabilities.
   4. Where applicable, provide a compatible sealant primer.

D. Backer:
   1. Joint sealant backer is required for all applications.
   2. Unless otherwise required for specialized conditions, joint sealant backer shall be a closed-cell, polyethylene rod.
   3. Where limitations prevent the use of a backer rod, specify a polyethylene, self-adhesive, bond-breaker tape shall be used.

E. Filler:
   1. Joint filler shall be specified to provide filling of the gap and to prevent displacement and improper location of the backer.
   2. Joint filler shall be a continuous, non-bleeding material compatible with the joint conditions.

PART 3 – EXECUTION

3.01 AREAS RECEIVING WORK

A. Exterior and interior joints surrounding all louver, door, and window frames; and all other exterior wall penetrations. Leave weep holes in caulking at 2'-0" centers under all sills.

B. All interior joints where masonry abuts structural steel columns.

C. Vertical joints each side of interior intersections of framed interior drywall with masonry walls.

D. Millwork and casework joints against walls.

E. Embed all exterior door thresholds in caulking.

F. All laps of sheet metal work.

G. Penetrations through attic air barriers occurring between suspended ceiling system and overhead structure.

H. Sill flashings at windows.

I. Exterior and interior thru-wall control joints. Refer to Section 04000/ Masonry, General.

J. Intersections of interior masonry partitions with exterior walls.

K. Perimeter ceiling joints where plaster casing bead abuts wall surface.

L. Glazing set in hollow steel, wood and metal glazing stops.

M. Control joints in hard tile floors.

N. Saw cut control joints in all interior floor slabs which are designated to receive a sealed or painted finish or which are to remain exposed concrete.

O. All other areas indicated on drawings; or as necessary, determined by DP, required to seal interior and exterior joints. All exterior and interior joints between dissimilar materials are to be caulked.

3.02 PREPARATION

A. Insure that all surfaces to be worked are completely dry. Thoroughly clean and scrape all joints. Rake mortar and other foreign materials smoothly from joints. Tape, and otherwise protect from damage, all exposed surfaces adjacent to caulking.

3.03 APPLICATION

A. Prime joints with approved primer following manufacturer's printed directions, and using a brush that will reach all recesses to be caulked. Where joints are excessive, wedge packing into joint and pack tightly to a point approximately $^1/_2$" back of the finish face. Drive caulking compound into joint with proper caulking gun, or knife, which has sufficient pressure to fill all recesses. Caulking gun heads must be of proper size to fit all openings. Butter inside of masonry openings, or surface of frames to be set, with thin neat line of caulking compound. No manufactured caulking beads are permitted. Tool all caulking joints slightly concave and uniformly smooth.

3.04 POINTING

A. At completion, neatly point all joints, and remove all excess materials. Neatly cove internal angles of all caulked joints. Clean all surfaces of adjacent construction, of all excess materials and/or soiled areas resulting from work.

END OF SECTION