

**Jefferson County School District, R-1
Support Services**

TECHNICAL GUIDELINES

**DIVISION 07 – THERMAL AND MOISTURE PROTECTION
November 1, 2006**

DIVISION 07-THERMAL AND MOISTURE PROTECTION
07 10 00 Dampproofing and Waterproofing – November 1, 2006

- Work in this section is open to any product or material meeting the requirements of this Technical Guideline
- Submittals
 1. Product Data: Required
 2. Test Reports: RILEM tube required for water repellents on masonry
 3. Closeout: All submittals listed above, updated to record status
- Termination detailing is critical to system performance
- Dampproofing: No requirements
- Below grade waterproofing
 1. Waterproofing: Comply with NRCA Roofing and Waterproofing Manual
 2. Required under concrete slabs on grade where hardwood flooring is scheduled.
 3. Detail and specify penetration closures and terminations, transitions
- Water Repellents
 1. Water repellents are not a substitute for proper brick wall or veneer design or construction. Waterproofing tends to cause the masonry to hold internal moisture, which can create more problems than it solves. Except as specified in this section, brick walls should not be treated with any coating or applied finish.
 2. Required on exterior concrete masonry walls and interior masonry surfaces within 10 feet of finished floor at secondary schools (middle and senior high schools).
 3. Optional at interior concrete and masonry walls elementary schools and other facilities.
 4. Materials summary
 - a. Clear
 - b. Water-borne
 - c. Penetrating type (.10 inch minimum)
 - d. Silane or Siloxane
 - e. Water Vapor transmission = 90% minimum
 - f. Alkaline-stable
 - g. EPA VOC compliant
 5. Prohibited materials:
 - a. Acrylic
 - b. Elastomer
 - c. Epoxy
 - d. Mineral gum waxes
 - e. Paint
 - f. Silicone resins
 - g. Stearates
 - h. Urethanes
 - i. Wax

6. Do not apply water repellents to brick masonry:
 - a. Except as approved by BIA and RMMI
 - b. In place less than six months
 - c. Which has been wet or damp within one week
 - d. Exhibiting efflorescence
 - e. Which has not been thoroughly reconstructed/repainted/cleaned

END SECTION 07 10 00

07 21 00 Thermal Insulation – November 1, 2006

- Work in this section is open to any product or material meeting the requirements of this Technical Guideline.
- Permitted Materials:
 1. Extruded expanded polystyrene (XEPS)
 2. Molded expanded polystyrene (MEPS)
 3. Polyisocyanurate (PISO)
 4. Glass Fiber Batt
- Insulation or insulating sealant is required at the following locations:
 1. Exterior door and window perimeter shim voids
 2. Boiler room ceiling under occupied space

END SECTION 07 21 00

07 22 00 Roof and Deck Insulation – November 1, 2006

- Work in this section is open to any product or material meeting the requirements of this Technical Guideline
- Submittals
 1. Product Data: Required
 2. Shop Drawing: Required for tapered Roof and Deck Insulation only
 3. Samples: Preferred
 4. Design Data, Test Reports: Preferred
 5. Closeout: Submittals listed above, updated to record status.
- Under-deck roof insulation is not recommended due to condensation problems.
- Materials & Installation
 1. Multiple layers with staggered joints
 2. Bottom layer: Polyisocyanurate
 3. Top layer = 1 inch minimum thickness
 - a. Perlite
 - b. Fiberglass
 - c. Wood Fiberboard

4. Fasteners: Coated types are prohibited.
5. On fluted metal deck:
 - a. Align joints to occur on rigid surfaces only.
 - b. Joints parallel to the span of the metal deck are prohibited over flutes/voids.
6. Roof drain
 - a. Taper is mandatory; 24 inch minimum radius from drain
 - b. 1.5 inch minimum thickness in contact with drain fastener and plate

END SECTION 07 22 00

07 24 00 Exterior Insulation and Finish Systems – November 1, 2006

- Exterior Insulation and Finish Systems (EIFS) are categorically prohibited for new construction.
 1. Permitted for repair/reconstruction of existing systems only

END SECTION 07 24 00

07 25 00 Weather Barriers – November 1, 2006

- Work in this section is open to any product or material
- Vapor Retarders: Grade D 15 pound building paper or better
- Air Barriers: No requirements

END SECTION 07 25 00

07 27 00 Air Barriers – November 1, 2006

- Air barriers are recommended as an important component of building envelope performance, energy efficiency, indoor air quality, mold control, and sustainability.

END SECTION 07 27 00

07 30 00 Steep Slope Roofing – November 1, 2006

- Work in this section is open to any product or material meeting the requirement of this Technical Guideline.
- In the absence of other information, standards of the following organizations apply:
 1. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual - Current edition

- Submittals
 1. Product Data: Required
 2. Samples: Required
 3. Closeout: Submittals listed above, updated to record status. Samples excluded.
- Limit shingle applications to roofs steeper than 3:12 pitch and only with the approval of Jefferson County School District, R-1.
- Shingles: Asphalt and modified composition only
 1. SBS modified laminated
 2. Class four impact resistant
 3. 275 pounds per square
 4. Exposure 5 ¼ inches to 5 ¾ inches
 5. 110 miles per hour wind rating
 6. Class A fire rated
- Roof Tiles: Prohibited
- Nail attachment only; nail gun not recommended, staples are prohibited
- Install ridge shingles with heel to North or West

END SECTION 07 30 00

07 40 00 Roofing and Siding Panels – November 1, 2006

- Work in this section is open to any product or material.

END SECTION 07 40 00

07 41 13 Metal Roof Panels – November 1, 2006

- Work in this section is open to any product or material meeting the requirements of this Technical Guideline.
- Structural metal roof panels:
 1. Prohibited for IBC A and E occupancies.
 2. Not recommended elsewhere.
 3. 0.5:12 minimum slope
- Architectural metal roof panels are permitted only when all of the following criteria apply:
 1. Slope 4:12 or greater
 2. Simple roof geometry
 3. Fewer than one roof penetration, curb, interruption, or other field details per 10 squares of total roof area.
- In the absence of other information, standards of the following organizations apply:
 1. Sheet Metal and Air Conditioning Contractors National Association (SMACNA) Architectural Sheet Metal Manual.
 2. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual – Current edition

- Submittals
 1. Product Data: Required
 2. Shop Drawing: Required; Including all detail conditions applicable to the project.
 3. Samples: Required
 - a. Color
 - b. Prototypical transverse and end seams
 4. Closeout:
 - a. Submittals listed above, updated to record status. Samples excluded.
- Underlayment
 1. Asphalt saturated roofing felt
 2. Continuous self-adhering membrane is required at eaves, valleys, and other details and transitions, particularly where ice dams could form.
- Slip Sheet: Mandatory; Kraft paper or equivalent
- Metal Roof Panel
 1. Pre-formed steel panels with factory applied “Galvalume” aluminum-zinc alloy coating and low gloss fluopolymer finish.
 2. Gauge as required to maintain hydrostatic performance during positive loading and wind uplift conditions.
- Attachment: Fully concealed clip
- Transverse seam:
 1. Hydrostatic design
 2. Preferred: Traditional double lock or 90° single lock standing seam detail per SMACNA.
 3. Permitted: Proprietary snap seams with batten
 4. Prohibited: Trapezoidal and vertical seams.
- End lap seam:
 1. Hydrostatic design
 2. Preferred: None (continuous panel ridge to eave)
 3. Permitted: six inch minimum lap with sealant, gasket, or proprietary detail
- Details
 1. Hydrostatic design
 2. Fasteners: Galvanized with EPDM washers
 3. Typical Flashing: EPDM covered with metal flashing to match roof material
 4. Valley: Lock panels directly into hems of valley flashing.
 5. End wall: Two piece flashing system to permit independent panel movement.
 6. Penetrations: Pre-formed EPDM, or silicone rubber flashing boot.
 7. Curb: Premanufactured with material and finish identical to roof panel. Cricket at high side and continuous side flashing sufficient to extend into adjacent seam.
 8. Snow guards: Mandatory wherever roof eave is in within sixty inches (measured horizontally) from pedestrian areas. The preferred design is for pedestrian areas to coincide with gable ends.
 9. Through-panel attachment of snow guards and accessories is categorically prohibited.
 10. Field Modified or constructed details are prohibited.
 11. Interior gutters are prohibited.

END SECTION 07 41 13

07 50 00 Membrane Roofing – November 1, 2006

- Work in this section is open to any product or material meeting the requirements of this Technical Guideline.
- Roof Design
 1. Design of roof assemblies for Jefferson County School District, R-1 facilities is restricted to:
 - a. Qualified licensed professional Roofing Consultants.
 - b. Licensed Architects/Engineers with demonstrated expertise in roofing.
 2. Design roof system to withstand wind loads, structural movement, thermally induced movement, exposure to wind, hail, sunlight, and temperature extremes and periodic foot traffic without failure.
 3. Design an integrated roof system comprised of fully compatible components.
 4. Performance targets for roof assembly:
 - a. 20 year minimum system life expectancy
 - b. UL Class A fire rating - reference assembly designation in contract documents
 - c. FM I-90 Wind Uplift rating; Reference assembly designation in contract documents
 5. Roofing in the vicinity of science, art, and kitchen exhausts demand special design considerations.
 6. Plans need to clearly distinguish structure/deck slope from slope of tapered insulation.
 7. Caution: Large loose ballast is an ideal vandal's projectile.
- Roofing systems preferred by Jefferson County Schools are, in order of preference:
 1. (BUR) Built-up Bituminous Roofing
 2. 90 Mil Epoxy, fully adhered
 3. 60 Mil Epoxy, fully adhered
- Drainage
 1. Interior primary drainage is preferred over perimeter drainage.
 2. Perimeter drainage is permitted for overflow.
 3. Where upper level drains discharge onto lower levels, provide splash blocks.
 4. Slope all roof sections to drains by means of tapered insulation or sloped structure.
 - a. 1/4 inch per foot minimum design slope with at least 1/8 inch per foot slope remaining after settlement due to maximum live loads and structural "creep."
 - b. 1/8 inch per foot minimum slope is allowed for roof retrofit when approved by Jefferson County School District R-1.
 - c. Install crickets or saddles to allow immediate drainage away from membrane flashings wherever water may pond in valleys between drains, against walls and on the upslope side of large curbs.
 - d. Backslope must be minimum of twice the slope of the roof field.
 5. Locate drains and scuppers at distances proportional to insulation dimensions.
 6. Downspouts: Design, detail, locate, and install to impede unauthorized access to roofs.

- Details
 1. Keep the shapes of all roof surfaces, parapet walls, etc. as simple as possible; rectilinear configurations are preferred.
 2. Maintain 18 inch minimum horizontal separation between individual roof details, curbs, penetrations, drains, valleys, crickets and other changes in level.
 3. Detail to maintain continuity at each termination, transition, intersection, interruption, penetration, change in direction, and seam.
 4. Isometric details are preferred for transitions and intersections to avoid the need for field-based decisions by the installer(s).
 5. Consider ice and drifting snow in detail designs.
 6. Base flashings: 6 inches minimum and 18 inches maximum vertical dimension above the highest point of roof membrane.
 7. Terminations
 - a. 45° cant is required at all terminations to vertical surfaces and is preferred for gravel stop edge detail.
 - b. At non-bearing walls, detail base flashing attached to wood blocking secured to the roof deck, not the wall.
 - c. Termination bars are prohibited.
 8. Penetrations
 - a. Detail counterflashed jacks, vents and flues.
 - b. Space vertical pipe and conduit penetrations to accommodate individual cone flashing with storm collar.
 - c. Clustered utility penetrations are preferred: Detail watertight, sloped-top sheet metal jack with pipe and conduit penetrations on the side.
 - d. Do not rely on "self-flashing" flanges on skylights, HVAC units, etc.; Install true removable counterflashing on these curbs before mounting the unit.
 - e. Pitch pockets are prohibited
 9. Utilities and Equipment
 - a. Curbless equipment is prohibited.
 - b. Supports shall not penetrate the roof membrane.
 - c. Detail permanent non-combustible blocking equal to the thickness of the deck insulation at support locations where the loading will exceed the crushing strength of the roof insulation.
 - d. Detail base flashing or walk pad material between support material and the roof membrane.
 - e. Cooling towers: Extend curb to the roof deck around the tower area to prevent lateral movement of water in the insulation. Smooth surface roof membrane is recommended around the tower.
 10. Expansion Joint Locations:
 - a. Structural joints
 - b. Change in material or span direction of structure or deck
 - c. As required to form a rectangular roof area
 - d. To separate roof areas over differing interior temperature/humidity conditions.
 - e. Other locations recommended by NRCA
 11. Miscellaneous
 - a. Perimeter blocking must be continuous and match the insulation thickness.

- Access
 1. Design access to each roof level and area from walkout doors or scuttle hatches without having to re-enter the building.
 2. Roof access ladders: Division 05
- Coordinate various disciplines and trades; particularly mechanical, plumbing, and electrical at all stages of roof design and construction.
 1. Roofing (sub) contractor is responsible for finishing and flashing roof drains and scuppers.
- In the absence of other information, standards of the following organizations apply:
 1. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual - Current edition
- Submittals
 1. Product Data: Required
 2. Shop Drawings: Required. Indicate types, base flashing, lap configurations, nailing patterns, supplemental details and other information necessary to determine compliance with specifications
 3. Test Reports:
 - a. UL fire resistance
 - b. FM wind uplift
 4. Certificates:
 - a. Certification from the membrane manufacturer that the roofing (sub)contractor and superintendent are trained and authorized to install the specified system.
 - b. Certification from the membrane manufacturer indicating fasteners are capable of providing a minimum static backout resistance of 15 inch pounds.
 5. O&M Data: Required; Include MSDS.
 6. Samples: Required
 - a. All roofing: Terminations, fasteners
 - b. Single Ply Systems: Membrane, base flashing, ballast
 7. Manufacturer Field Reports
 - a. Upon completion of the installed work, submit copies of the manufacturer's final inspection.
 8. Warranty: Not permitted; Jeffco School District R-1 considers extended-term roof warranties to be manufacturer limitations of liability.
 9. Closeout:
 - a. All submittals listed above, updated to record status.
 - b. Copies of the manufacturer's final inspection report.
- Restrictions
 1. Coal tar BUR is prohibited except for work on existing coal tar roof systems.
 2. Inverted Roof Membrane Assemblies (IRMA) are prohibited.
- Built-Up Bituminous Roofing: Preferred
 1. Four-ply BUR system with mineral surface fiberglass cap sheet or gravel embedded in final floodcoat.
 2. Felts: Type IV fiberglass or polyester reinforced.
 - a. Organic felts acceptable for base sheet, prohibited elsewhere.

3. Asphalt: Labeled with the following minimum information:
 - a. Manufacturer
 - b. Asphalt Type
 - c. Equiviscous Temperature (EVT)
 - d. Flash Point
- Elastomeric Membrane Roofing: Permitted
 1. Vulcanized Elastomers: Ethylene Propylene Diene Monomer/Terpolymer (EPDM) membrane
 - a. Membrane thickness = .060 inch minimum
 - b. Membrane Tensile strength = 1200 psi minimum
 - c. Membrane Brittleness point = -49°F or lower
 - d. Membrane Workable temperature range = -20° to +160° F.
 - e. Membrane Water absorption = 3% of mass maximum
 - f. Membrane Color: Natural black. Pigmented membranes not recommended.
 - g. Attachment: Adhered
 2. Chloroprene Rubber (Hypalon) membrane
- Cold-Applied Bituminous Roofing: Prohibited
- Thermoplastic single ply membranes (PVC, EIP, TPO): Prohibited
- Modified Bituminous Membrane Roofing: Prohibited
- Fluid-Applied Roofing: Prohibited
- Coated Foamed Roofing: Prohibited
- Roll Roofing: Prohibited
- Roof Maintenance and Repair: No requirements
- Source Quality Control
 1. Provide UL labeled materials that have been listed in the current NRCA "Roofing Materials Directory" for the applications indicated.
 2. Five consecutive year minimum firm history of manufacturing specified roofing items.
 3. Seven consecutive year minimum history of roof system applications on commercial/institutional buildings in the western USA; with at least 5,000 squares installed in Colorado or similar climate.
 4. Manufacturer and Distributor must be one and the same.
 - a. "Second tier" and re-labeled products are prohibited without prior authorization of Jefferson County School District, R-1.
 - b. "Roofing only" manufacturers are preferred.
 5. Product Support: Full time individual or firm based or branched in Colorado.
 6. To the greatest extent possible, all roof system components should be from a single manufacturer.
- Acceptable Installers
 1. Roofing (sub)contractor:
 - a. Subject to a prequalification process established by Jefferson County School District, R-1
 - b. In business under the same name in the state of Colorado for no less than 24 consecutive months prior to the bid opening.
 - c. Preference will be given to members of: National Roofing Contractor's Association (NRCA) and/or Western States Roofing Contractor's Association (WSRCA)

2. Project Superintendent:
 - a. Certified by the roofing manufacturer for warranted installations for at least 12 months prior to commencing work in this section.
 - b. Previous experience with no less than 500 squares of specified system.
 - c. Full-time presence at the jobsite during roofing activities.
- Preparation
 1. An on-site pre-construction conference is mandatory before commencing work in this section.
 2. To the greatest extent possible, roofing work should not commence until drains, curbs, cants, blocking, nailers, penetrations and related construction work is completed.
- Installation
 1. Cover board is mandatory over rigid foam plastic roof insulation
 2. Built-Up Bituminous Roofing
 - a. Mechanically fasten first ply over lightweight insulating concrete decks.
 - b. Maintain asphalt temperature within 25°F of recommended equiviscous temperature at the point of application.
 - c. To prevent asphalt voids and accelerated membrane failure, workers should not walk over hot felts as they are being rolled out.
- Retrofit Roofing
 1. Remove old roof to structural deck.
 2. Inspect and replace inadequate roof deck.
 3. Venting base sheet or equivalent
 4. Recondition drains and scuppers
 5. Add overflow drains per Code.
 6. Slope to drain
 7. Replace inadequate sheet metal
- Field Quality Control
 1. Field verify positive drainage of substrate before commencing roofing work.
 2. Details: Where NRCA recommended details conflict with manufacturer's standard details, review both with Jefferson County School District R-1 for final disposition.
 3. Roof Drains
 - a. Protect roof drain bowls, pipes, and clamping bolt holes from viscous bitumen, granules, and ballast.
 - b. Seal drain perimeter daily to prevent moisture intrusion below roof membrane.
 - c. Clear roof drains and lines at the end of each workday.
 4. Retrofit Roofing
 - a. Contain tear-off debris.
 - b. Start only that portion that can be completed that workday.
 - c. Daily work must have a temporary dry-in to existing roof at day's end.
 - d. Protect site, building, systems, vehicles, occupants, pedestrians.
 - e. Test roof drains both before and after roofing work
 - f. Raise curbs to specified design clearances
 5. Shut down roof mounted utilities, including air handling equipment, before roofing.

6. Inspection: Upon completion of the installation, the applicator shall arrange for an inspection to be made by a technical (non-sales) representative employed by the roofing system manufacturer to determine whether or not corrective work will be required before the warranty will be issued.
7. Material Safety Data Sheets (MSDS): Must be on location at all times during the transportation, storage and application of materials.
- Protection
 1. Seal edges of in-progress roofing work before end of each workday.
 2. Remove strainers and plug roof drains in areas where work is in progress.
 - a. Install flags or other telltales on plugs.
 - b. Remove plugs each night and screen drain. Test drains at project completion.
 3. Protect completed roofing from traffic, unusual wear, and damage by subsequent construction activities.
 4. Protect building surfaces, finishes, furnishings and site improvements from roofing materials and activities.

END SECTION 07 50 00

07 60 00 Flashing and Sheet Metal – November 1, 2006

- Work in this section is open to any product or material meeting the requirements of this Technical Guideline.
- In the absence of other information, standards of the following organizations apply:
 1. Sheet Metal and Air Conditioning Contractors National Association (SMACNA) Architectural Sheet Metal Manual, current edition.
 2. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual – Current Edition
- Submittals
 1. Product Data: required for prefabricated components
 2. Shop Drawing: preferred
 3. Samples: preferred
 4. Closeout: Submittals listed above, updated to record status. Samples excluded.
- Materials
 1. Preferred:
 - a. Prefabricated, pre-formed, and prefinished manufactured composite profiles and components are preferred over site fabrications.
 - b. Masonry flashings: Flexible, self-adhering rubberized sheet (concealed) combined with stainless steel termination strip to or beyond the face of the tooled mortar joint.
 2. Prohibited:
 - a. Plastic, PVC
 - b. Aluminum
 - c. Lead
 - d. Zinc
 - e. "Weathering" type materials

- Minimum gauge standards for metal counter flashing and reglets (dimensions = exposed face):
 1. Up to 6 inches 26 gauge
 2. 6 to 8 inches 24 gauge
 3. 8 to 10 inches 22 gauge
 4. 10 to 15 inches 20 gauge
 5. Over 15 inches Not recommended due to "oil canning"
- Fasteners:
 1. Galvanized or stainless steel screws with metal and neoprene washers
 2. Continuous metal cleats are preferred for securing counterflashing
 3. 24 inch o.c. maximum spacing
 4. Conceal fasteners to the greatest extent possible.
 5. Limit exposed fasteners to vertical surfaces.
- Design
 1. Design, detail, and quality requirements of Section 07 50 00 apply.
 2. Design sheet metal to shed water.
 3. Extend drip edge ¼ inch minimum beyond face of wall at steel lintels, shelf angles, and other metals.
 4. Flashing may terminate at tooled mortar joint elsewhere.
 5. Specifications and details must clearly indicate the treatment of both horizontal and vertical ends of flashing and sheet metal assemblies.
 6. Maintain continuity around corners and jogs.
 7. End dams with overlapped and sealed corners are required at terminations and transitions.
 8. Hem exposed edges
 9. Locate seams above highest anticipated water level
 10. In no case should water flow over horizontal metal except at a scupper.
 11. Use of solder or rivets is prohibited.
 12. Provide standing seam or equivalent raised joints in all sheet metal exposed to the weather, including HVAC housings
- Curb: Detail and specify metal assemblies to disassemble to permit access to the base flashing without any interference with the operation of curb mounted equipment above.
- Gutters and Downspouts
 1. Not recommended
 2. Prohibited at North exposure and on roofs with less than 2:12 slope
 3. Minimum 1 DS per 50 lineal feet of gutter or oversize size gutter by 25% for every additional 10 lineal feet of DS separation.
 4. Provide overflow at header
 5. Open-front downspout design is preferred; Custom profiles require Jefferson County School District prior approval.
 6. Design, detail, locate, and install to discourage unauthorized access to roof.
 7. Surface discharge onto pavement is prohibited.
- Scupper
 1. Per SMACNA
- Gravel Stop
 1. Per NRCA

- Head and shelf angle
 1. Mandatory at all exterior fenestration and lintels
 2. Extend flashing a minimum of 2 inches horizontally beyond the ends of the structural steel
- Sill
 1. Flashing pans with upturned ends are mandatory at window sills.
 2. Extend pan a minimum of 6 inches horizontally beyond each jamb.
- Foundation
 1. Frame structure: Terminate behind building wrap / vapor barrier. Do not puncture with fasteners.
 2. Masonry cavity wall: 4 inches minimum vertical leg + 4 inches minimum horizontal extension into bed joint of backup masonry.
 3. Lap ends 6 inches and seal
- Masonry Parapet
 1. Through-wall flashing is mandatory.
 2. Cap flashing with continuous watertight cleat is mandatory; slope toward roof at 1:12 minimum, and extend 4 inches minimum below top of masonry.
- Counterflashing:
 1. Establish counterflashing height from the highest membrane base flashing elevations
 2. Detail counterflashing along the sides of sloped roof sections, especially at masonry.
 3. Detail counterflashing to lap and cover at least 3 inches of roof membrane base flashing.
- Diverter: Mandatory where a sloped roof terminates adjacent to a parallel wall
- Expansion joints:
 1. Required within 2 feet of corners & intersections.
 2. Locate at 15 feet maximum spacing elsewhere (10 feet preferred).

END SECTION 07 60 00

07 70 00 Roof and Wall Specialties and Accessories – November 1, 2006

- Work in this section is open to any product or material
- Submittals
 1. Product Data: Required
 2. Samples: preferred
 3. Closeout:
 - a. All submittals listed above, updated to record status.
- Do not attach or route any mechanical or electrical system components directly to the roof or in a manner that could interfere with future roof maintenance/replacement.
- Roof Expansion joints, minimum requirements:
 1. Maximum spacing = 200 lineal feet; 150 lineal feet preferred.
 2. At continuation of architectural/structural building joints
 3. At transitions between new and existing roof areas.
 4. At changes in roof deck material or direction.
 5. At changes in roof direction so that all roof areas are approximately rectangular.
- Mount rooftop mechanical and electrical equipment and distribution systems only on flashed curbs or permanent pipe pedestals.

- Permanent walkway pads or pavers are required
 1. Around the perimeter of major rooftop mechanical equipment
 2. Between major rooftop equipment and access points.
- Restrictions
 1. Use of roof vents is not recommended.
 2. Surface applied reglet counterflashings are categorically prohibited.
 3. Raceway conduits and gas lines must have a minimum 12” clearance from roof surface to bottom of pipe(s).
- Materials
 1. Preferred:
 - a. Prefabricated, pre-formed, and/or prefinished manufactured composite profiles and components are preferred over site fabrications.
 2. Prohibited:
 - a. Plastic
 - b. Aluminum
 - c. Lead
 - d. Zinc
 - e. “Weathering” type materials
- Manufactured Roof Specialties such as copings, counterflashings, gravelstops, gutters, and downspouts must have prefabricated corners and slip-type connectors.
 1. Continuous sealant pocket as appropriate to the detail
- Roof expansion assemblies:
 1. Continuous (rolled) expansion covers preferred over segmented type (to minimize joints).
 2. Detail and specify manufacturers standard prefabricated transition and termination pieces.
 3. Locate within 2 feet of corners and intersections.
 4. Locate at 15 feet maximum spacing elsewhere (10 feet preferred).
 5. Detail to match height of base flashings.
- Jacks: Prefabricated jacks with integral boot, base flange and clamp.
- Cap flashing: Use continuous watertight cleat or apply continuous sealant bead behind drip.
- Hem exposed edges
- Roof Hatch: Locate hinge end opposite ladder end
- Fasteners:
 1. Galvanized or stainless steel screws with metal and neoprene washers
 2. Continuous metal cleats are preferred for securing counterflashing.
 3. 24 inch o.c. maximum spacing
 4. Conceal fasteners to the greatest extent possible
 5. Limit exposed fasteners to vertical surfaces.
- Maintain sheet metal flashing and trim continuity around corners and jogs.
- End dams: Required at terminations and transitions.
- Locate seams above highest anticipated water level, 6 inch minimum lap.

END SECTION 07 70 00

07 80 00 Fire and Smoke Protection – November 1, 2006

- Work in this section is open to any product or material.
- Work in this section is to be performed by a single source specialized individual or firm for projects meeting any of the following criteria:
 1. New construction and building additions, regardless of contract amount
 2. Renovation/remodel involving more than 5,000 gross square feet
 3. HVAC, plumbing, electrical, and communications projects involving more than 100 square inches of penetrations of fire-rated walls, floors or ceilings.
- In the absence of other information, standards of the following organizations apply:
 1. Underwriter's Laboratories Fire Resistance Directory, current edition
- Submittals
 1. Product Data: required
 2. Shop drawings or schedule: Preferred. Mandatory for projects with total contract value exceeding \$1,000,000.
 3. Manufacturer Instructions and Field Reports: Required
 4. Closeout: All submittals listed above, updated to record status.
- Specify Underwriter's Laboratories fire rated assembly designations in the contract documents
- Firestops are required at every construction joint and penetration in fire rated assemblies.
 1. Note: Properly installed firestopping serves a secondary purpose of acoustical separation.
- Sprayed cementitious fireproofing as required per IBC
 1. Minimum bond strength per ASTM E736: 200 psf
 2. Air erosion per ASTM 859: 0.00 grams loss
 3. Surface Burning per ASTM E84: Smoke = 0, Flame = 0, Fuel = 0
 4. Use W/D ratio to determine application thickness
 5. Remove paint, lubricant, compounds and other contaminants from substrate metal as recommended by the fireproofing manufacturer to assure specified bond strength.
 6. Mineral fiber fireproofing is categorically prohibited
- Jefferson County School District, R-1 reserves the right to perform a separate commissioning inspection and/or retain the services of an independent testing agency to inspect, sample, and confirm compliance with work in this section.

END SECTION 07 80 00

07 90 00 Joint Protection – November 1, 2006

- Work in this section is open to any product or material meeting the requirement of this Technical Guideline
- Proprietary specifications are strongly recommended for work in this section, along with a comprehensive sealant schedule that correlates specific materials, locations, and detail conditions.
- Submittals
 1. Product Data: Required
 2. Samples: Color selection

3. Manufacturer Instructions: required
4. Closeout:
 - a. Submittals listed above, updated to record status. Samples excluded.
 - b. Update sealant schedule to as-constructed status.
- Sealant is required at horizontal and vertical interior and exterior building expansion, and control joints where movement is anticipated and at junctures of dissimilar materials.
- "Caulk" applications are limited to non-moving interior fill conditions.
- Sealant:
 1. Elastomeric materials to span widths from 1/16 inch to 3 inches between a variety of materials and exposure conditions with watertight, airtight, and continuous seals without staining or deteriorating adjacent construction.
 2. For general application, in the absence of special conditions, 1 or 2 part silicone or polyurethane sealants are preferred.
 3. Preformed materials: Permitted
 4. Precompressed expanding foam sealant tape is preferred for joints over 1-1/2 inches wide.
- Backer Rod: Closed-cell material only
- Details
 1. Joint profiles should be simple with opposing flat parallel surfaces
 2. Three and four point sealant contact conditions are prohibited unless otherwise approved by sealant manufacturer.
 3. Design joints to permit future maintenance (resealing).
- Installation
 1. Protect materials from temperature extremes and execute work in this section only during environmental conditions recommended by the sealant manufacturer
 2. Preparation is critical to joint performance; Clean, prime, and skim coat joints per sealant manufacturer
 3. Width to depth ratio per sealant manufacturer
 4. Maximum sealant thickness: 3/8 inch unless otherwise recommended by sealant manufacturer.
 5. Field adhesion testing is recommended.

END SECTION 07 90 00

07 95 00 Expansion Control – November 1, 2006

- Work in this section is open to any product or material.
- Submittals
 1. Product Data: Required
 2. Closeout: Submittals listed above, updated to record status.
- Applications
 1. Manufactured expansion control fabrications are mandatory:
 - a. To isolate new construction from existing
 - b. At structural separations in new construction.

END SECTION 07 95 00