

**STATE OF ILLINOIS
CAPITAL DEVELOPMENT BOARD
ROOFING PROGRAM HANDBOOK**
Current as of April, 2010
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April, 2010

I. GENERAL

- A. This handbook states the Capital Development Board's (CDB) requirements, procedures, and design criteria for roof construction on new and existing buildings, and new pre-engineered metal buildings. The goals of this program are **proper roof design, correct installation, and a valid warranty**.
- B. The Capital Development Board has two Roofing Specialists: Mike Kelly (217/557-6139), and Bill Cornett (217/782-8474).

II. MANUFACTURER ACCEPTANCE INTO THE ROOFING PROGRAM

- A. Financial qualifications meeting CDB acceptance formula.
- B. Roofing system(s) are evaluated and accepted by CDB.
- C. The manufacturer provides training for their approved contractors.
- D. The manufacturer has staff to review plans and specifications.
- E. The manufacturer provides inspection of completed roofs.
- F. The manufacturer agrees to sign the CDB Roofing System Manufacturer's Warranty - (RSMW).
- G. The manufacturer agrees to respond promptly to defect notification.
- H. Requirements for acceptance of pre-engineered metal building manufacturers are the same as for membrane manufacturers, except financial qualification is not required.
- I. CDB will periodically review current and new manufacturers, their products and systems. As changes occur revisions will be made to this Handbook, the Guide Specifications, and Roster of Accepted Manufacturers. The A/E should obtain current copies with each new CDB project.
- J. **NOTE:** Manufacturer's approval or certification shall not constitute whole or partial endorsement of building design or any material or service not part of the manufacturer's advertised system.
 - 1. The A/E shall select the most appropriate system for the project from the CDB Guide Specifications. The roofing system design shall include only materials and components furnished or accepted by the roofing system manufacturer.
 - 2. Each project shall be designed and bid using a single generic system.
 - 3. The term "acceptable products" in the specifications does not constitute or imply CDB's endorsement of the product. Manufacturer's claims of such endorsement are not permitted. Manufacturers are permitted to tell architects and clients that their system is accepted by CDB, but not allowed to publish it. The order of appearance in the specifications is alphabetical and does not imply preference.

III. DEFINITIONS

- A. New construction: All roofing components from the sloped structural deck, up.
- B. Re-roofing: New components from existing construction to remain in place, up.
- C. “Roofing Manufacturer”, also referred to as the “manufacturer”, is any one of the acceptable system manufacturers listed in the CDB Guide Specifications.
- D. “Manufacturer’s Warranty”: A warranty offered by the manufacturer to all owners.
- E. “Roofing System Manufacturer’s Warranty” (CDB Form RSMW): A special CDB warranty form signed by manufacturers participating in the CDB Warranty Program. It provides a standard warranty on all CDB membrane roofing work. The warranty length can now be modified by the A/E for 15, or 20 Years depending upon the manufacturer’s specification. The RSMW is included at the end of the CDB membrane Guide Specifications.
- F. “Roofing System Manufacturer’s Certificate” (CDB Form RSMC): An acknowledgment signed by each specified manufacturer’s technical staff that they have reviewed plans & specs submitted by the A/E during the design phase for compliance with their requirements for signing the RSMW. It is included as the final page of the membrane Guide Specifications. Do not print the RSMC in the Manual.
- G. “Pre-Engineered Metal Building Manufacturer’s Warranty” (CDB Form PBMW): A special CDB warranty form signed by building manufacturers participating in the Pre-Engineered Metal Building Program. It provides a standard warranty on metal building construction and is included at the end of the CDB Guide Specification.
- H. “Pre-Engineered Metal Building Manufacturer’s Certificate” (CDB Form PBMC): An acknowledgment signed by each specified manufacturer’s engineering staff that they have reviewed plans & specs submitted by the A/E during the design phase for compliance with their requirements for signing the PBMW. It is included as the final page of the Guide Specification. Do not print the PBMC in the Manual.
- I. “WARRANTY INFORMATION”: A CDB form inserted at the end of each roofing specification section that does **not** have a CDB Form RSMW or PBMW, such as asphalt shingles and standing seam metal. The manufacturer’s warranty is to be attached to this form when submitted at Substantial Completion.

IV. INVESTIGATION & SAMPLING FOR RE-ROOFING

- A. Perform a thorough on-site survey to determine existing construction and conditions, for example:
 - 1. Type of membrane, blisters, splits, bare felts, open flashings or seams, other defects.
 - 2. Amount of slope, whether structural or tapered insulation.
 - 3. Areas lacking positive drainage.
 - 4. Locations of sizes of all penetrations.

5. Locations, sizes, and conditions of drains, scuppers, gutters & down spouts.
6. Locations, conditions, and elevations of curbs and equipment.
7. Allowable loading on the deck and structure.
8. Walls, counter flashings, reglets, coping stone joints, coping cap joints, expansion joints, and all other components that are now or could be leaking and if not included in this project could allow water to leak under the new roof.

B. CDB **requires test cuts** of all existing membrane roofing. Infrared scans, nuclear moisture detection, or capacitance moisture testing may be useful on some projects.

1. Obtain the approval of the CDB Project Manager to employ a roofing contractor in the project locality who is certified in accord with the Illinois Roofing Industry Licensing Act to make test cuts and repair holes.
2. Information to be obtained from test cuts:
 - a. Type of material and number of roofing systems in place.
 - b. Condition of existing system: Moisture content, insulation attachment to the deck, membrane attachment to insulation.
 - c. Type, thickness, and attachment method of each layer of insulation.
 - d. Type and condition of the deck.
 - e. Locations of wet insulation, damaged decking, and quantities.
3. Attach a copy of the survey results to the RSMC submitted to each manufacturer.
4. Attach a copy of the survey to the first design submittal to CDB.
5. Under “Existing Construction” in the roofing specifications, insert a brief summary of the survey results.

V. ASBESTOS CONTAINING ROOFING REMOVAL

A. Coordinate with the CDB Project Manager for the inspection and sampling of **only suspect asbestos** containing materials.

VI. DESIGN PREPARATION

A. You are reviewing the Roofing Program Handbook. The other two CDB documents that should be read before starting design are listed below. They are available on our web site, www.cdb.state.il.us, under the Reference Library Section. The CDB Guide Specifications and Rosters of Manufacturers are listed under the Roofing Subset at the bottom of the Reference Library Section. If dated over 6 months ago, please contact a Roofing Specialist listed in the General Section on Page 2 for current editions.

1. DCM – Design and Construction Manual
2. Standard Documents for Construction

B. The Project Manager will provide the A/E with the following:

1. Scope of work and the budget survey for the project when available.

2. CDB building names and numbers for existing and new buildings.
 - a. **The names and numbers are to be listed at three locations, the covers of the drawings and manual, and in Section 01 11 00.**
3. Type of roof system requested by the using agency.
4. Using agency's requirements.

VII. DESIGN PHASE

- A. Select the system that best fits the building, deck type and slope, project requirements, and the budget.
- B. Meet Energy Star/Cool Roof Rating Council/State of Illinois guidelines:
 1. Basic options for low-slope applications would be (in order of preference):
 - a. PVC, fully adhered
 - b. TPO, fully adhered
 - c. White Modified Bitumen w/ factory applied film/coating which meets Energy Star or CRRC
 - d. White EPDM, fully adhered
 - e. Standing seam metal which meets Energy Star or CRRC
 - f. Field applied white coating
- C. Verify with a CDB Roofing Specialist that you have a **current** CDB Guide Specification to prepare the roofing portion of the project manual.
- D. Edit and complete the specifications where indicated by (*A/E NOTE) or (*) to fit the project. If in doubt about making changes, call a CDB Roofing Specialist.
- E. Provide compliance with:
 1. Appropriate local building codes.
 2. U.L. or Factory Mutual specifications as appropriate.
 3. The CDB A/E Manual, Project Manual Workbook, Standard Documents for Construction, Roofing Program Handbook, and the Guide Specifications.
 4. The manufacturer's requirements.
- F. **New construction: Minimum structural slope: 1/4" per foot.** All deviations shall be approved by a CDB Roofing Specialist.
- G. Detail drain sumps sloping at least 1/4"/ft. and extending 4 feet each side of the drain center (8' x 8' total), or until meeting other construction.
- H. Roof insulation thickness for both flat and tapered systems is limited to 6". All deviations shall be approved by a CDB Roofing Specialist.
- I. Specify 2-piece gravel stop/fascias, metal counter flashing, coping caps, and expansion joint covers by the roofing manufacturer when available. Unless these metal items are furnished by the roofing manufacturer, they are not covered under the RSMW warranty.
- J. Each roof area must have a minimum of two methods of draining. Overflow safety drains shall be connected to separate plumbing. When this is not possible, design overflow scuppers over walkways or other places where water will alert occupants to

a roof problem.

- K. **Good roof drainage governs overall design and placement of roof top units. Please advise the Heating and Ventilating designer of this.**
- L. **Re-roofing: Minimum slope: 1/8" per foot.** Ponding (48 hours after rain) is unacceptable and can **void** the warranty. Minor ponding occurs at 1/8" /ft.
 - 1. On the drawings make clear distinctions between new and existing work, existing construction to remain and existing construction to be removed.
 - 2. Reuse of sheet metal items may be permitted by a CDB Roofing Specialist only where non-corroding metal is in good condition, and will remain in place.

VIII. MANUFACTURER'S CERTIFICATION

- A. Membrane Roofing: The A/E shall submit roofing drawings, specifications, a self-addressed, stamped envelope, and a "Roofing System Manufacturers Certificate" (RSMC) with the heading filled-in, to each manufacturer's technical staff. Use a **current** CDB Roster of Accepted Manufacturers.
 - 1. New Construction: Make changes required by the CDB 50% Review and complete the roofing plans & specs faster than other document sections. When plans & specs contain all pertinent information, submit them to manufacturers.
 - 2. Re-roofing: Submit to the manufacturers when the documents contain all pertinent information.
- B. Pre-Engineered Metal Buildings: Submit drawings, specifications, loading, a self-addressed, stamped, envelope, and a PBMC with the heading filled-in, to each specified manufacturer. Use a **current** Roster of Accepted Manufacturers.
- C. Make all changes required by the manufacturers on the RSMC or PBMC and resubmit for approval. The A/E should have "No Exceptions" RSMC's or PBMC's prior to release of bidding documents to avoid a possible A/E error charge.

IX. MANUFACTURERS' RESPONSIBILITIES

- A. Manufacturers have the responsibility to approve:
 - 1. Roofing contractors.
 - 2. All roofing system components.
 - 3. Project drawings and specifications prior to bidding.
 - 4. Roofing shop drawings.
 - 5. Installation prior to issuance of the specified warranty.
- B. State on CDB Form RSMC or PBMC, all changes required to make the project documents conform to the manufacturer's requirements.
- C. The RSMC and PBMC state that the materials furnished or recommended will meet the project requirements.
- D. The RSMC and PBMC state that upon satisfactory completion of the installation by an approved contractor, and in accord with the manufacturer's approved drawings and specifications, they will issue the RSMW or PBMW.
- E. Return the RSMC or PBMC promptly to the A/E and copy the CDB Roofing Team.

X. A/E'S RESPONSIBILITIES

- A. Contact the accepted manufacturers as soon as possible and obtain their help in correctly designing the system.
- B. If tapered roof insulation will be specified, contact fabricators for help with lay-out and design. A list is available from the Roofing Specialists.
- C. For Ballasted Systems: Verify the deck and structure will support the load. **Ballasted systems are no longer accepted by CDB.**
- D. Minimum requirements for items shown on the drawings are:
 - 1. Complete roof plan, minimum scale: 1/8" - 1'-0".
 - 2. All slope directions and amount of slope.
 - 3. Tapered insulation lay-out including: valleys, hips, ridges, crickets and saddles at all except round penetrations.
 - 4. Drains with a minimum 1/4"/ft slope in 8' x 8' sumps, scuppers, gutters and downspouts.
 - 5. Expansion joints in the roof and intersecting walls.
 - 6. Roof top units, equipment, and walkway pads.
 - 7. Details appropriate to the roofing system.
 - 8. **Minimum** size of lettering, 1/8".

XI. RECOVER REQUIREMENTS

- A. Existing **Membrane** To Remain: Unless all of these conditions can be met on built-up, modified bitumen, or single ply systems, remove all existing membranes down to the insulation:
 - 1. Existing slopes are at least 1/4" per foot, verified by measurement.
 - 2. The surface will be a suitable substrate for the new system.
 - 3. The structure will accommodate the addition load.
 - 4. Approval of recover **separately noted** on the RSMC by each manufacturer.
- B. Existing **Insulation** To Remain: Unless all of these conditions can be met on built-up, modified bitumen, or single ply systems, remove all existing roof insulation:
 - 1. The membrane can be removed without damaging the insulation.
 - 2. Tests show no wet insulation, or:
 - a. If a small quantity is wet and is to be replaced, specify replacement type, thickness, and quantity in the Base Bid. **NOTE:** The use of "Unit Prices" requires approval by the CDB Project Manager.
 - b. Show areas of wet insulation to be replaced on the drawings.
 - 3. Tests show the insulation is properly attached to the deck (except ballasted).
 - 4. Approval **separately noted** on the RSMC by the manufacturers.

XII. GUIDE SPECIFICATIONS FOR MEMBRANE ROOFING SYSTEMS

- A. The Guide Specifications for membrane roofing include Forms RSMC and RSMW. After filling in the items in the right hand column, print the RSMW as the final two pages of the roofing section. Complete the heading and submit a RSMC with plans & specs to each manufacturer. Do not print the RSMC in the manual.
- B. Small Roofs under 500 Square Feet: Contact a CDB Roofing Specialist to determine if a RSMW will be required because of the minimum warranty fee.
- C. For work on **existing roofing still under warranty: Please call** a CDB Roofing Specialist and discuss the work. Use Guide Spec 07 59 00.
- D. Built-up Systems:
 - 1. 07 51 13 - Asphalt: 4 plies glass fiber & gravel surface
 - 2. 07 51 16 - Coal Tar Pitch: 4 plies glass fiber or organic felt & gravel
 - 3. 07 52 16 - Modified Bitumen: 3 plies including granular surfaced cap sheet.
 - a. **Note: Torch applied Modified Bitumen is NOT permitted on State buildings due to risk of fire.**
 - b. "Phasing" of Modified Bitumen is **NOT** permitted. The work must be divided so that all plies and cap sheet are installed in one day, and the perimeter properly night-sealed.
- E. Single Ply Systems:
 - 1. 07 53 23 - EPDM
 - 2. 07 54 19 - PVC/KEE

XIII. MEMBRANE ROOFING INSULATION

- A. Insulation shall be furnished by or acceptable to the roofing manufacturer to be covered under the RSMW.
- B. Comply with U.L. Class A fire rating on steel decks with polyisocyanurate or perlite.
- C. Specify the thickness of each layer. Specify 2 layers of insulation when the total thickness is 2" or more.
- D. Stagger joints at mid-points in a layer of insulation, and offset joints a minimum of 6" between layers.
- E. Design drain sumps sloping a minimum of 1/4" per foot and extending 4' each side of drain center (8' x 8') or until other construction occurs.
- F. A coverboard is considered a second layer when the joints are staggered from the insulation below it.
- G. When recommended by the roofing manufacturer, tape top layer joints.
- H. Tapered Insulation:
 - 1. Follow the manufacturer's flute span guide.
 - 2. Specify the minimum thickness and panel slope, not the finished slope.
 - 3. Specify at least 1/8" per foot slope on re-roofing, if the deck is level.
 - 4. Show a drain sump detail.
 - 5. Specify crickets & saddles by panel slope, and steeper than roof panels.

6. Design **crickets wide enough** to produce a minimum valley slope of 1/16" per foot.

I. Roof Insulation Restrictions:

1. Thickness of flat and tapered insulation is limited to 6". Additional roof drains may be needed. Slight variations may be permitted by a CDB Roofing Specialist.
2. Maximum board size is 4' x 4' when attached with asphalt or adhesive. Follow the manufacturer's recommendations when more restrictive.
3. Polyisocyanurate **shall** have a cover board: DensDeck, Securock, Invinsa, Isogard or 1/2" high density fiberboard as required by the roofing manufacturer for inclusion under the RSMW.
4. Extruded polystyrene is permitted only with ballasted EPDM, provided it will not be over asphalt or coal tar pitch membranes left in place.

J. Insulation Attachments:

1. Ballasted EPDM: Do not specify.
2. Fully Adhered EPDM:
 - a. Mechanically Fastened: Minimum of 1 fastener every 2 square feet or fastener pattern recommended by the insulation manufacturer which complies with the designed FM wind rating.
 - b. Adhesives Attachment: Shall be acceptable to the roofing system manufacturer, and included under the RSMW.
3. BUR & Modified Bitumen:
 - a. Mechanically fasten the 1st layer of insulation on a steel deck.
 - b. Asphalt/Adhesive Attachment: 2nd and subsequent layers.
4. Fasteners:
 - a. **Do not specify a system requiring fasteners on concrete, gypsum, or tectum decks.**
 - b. Specify corrosion resistant, furnished or acceptable to the roofing manufacturer.
5. Strip-mopping of asphalt adhered insulation is **NOT** permitted.

XIV. SHEET METAL

- A. Specify a General Contractor's 2 Year warranty, and a manufacturer's 20 year finish warranty on Kynar 500/Hylar 5000.
- B. Specify Kynar 500/Hylar 5000 on galvanized or galvalume, the only acceptable paint.
- C. Aluminum can either be mill finish or Kynar 500/Hylar 5000 prefinished.
- D. Do not specify plain galvanized for any roof top usage.
- E. Counter flashing is required over all termination bars, unless they are covered by over-hanging construction.
- F. Design edge metal to avoid restricting water flow to gutters.
- G. If sheet metal must be removed, do not specify its reuse.
- H. Recommended aluminum thicknesses:

1. Gravel stop/fascia .040 or .050
2. Coping cap .040 to .063 depending on width
3. Flashing, trim, soffit .024
4. Gutters .032
5. Downspouts .024

I. Specify copper or stainless steel if appropriate for the building.

XV. ROOF TOP ITEMS

- A. Specify 11ga. mill finish aluminum hatch covers. Primed galvanized steel is **not acceptable**.
- B. Show roofing membrane extending over the top of parapet walls under coping caps, and secured to the vertical face of wood blocking.
- C. If there will be equipment over much of a roof area, recommend the area be covered by a pre-engineered metal building with louvered walls.
- D. Advise the Heating and Ventilating engineers to specify:
 1. Aluminum or stainless vents and fans.
 2. Factory painted enclosed roof top units.
 3. Factory made pipe & conduit supports. **NO wood blocks.**

XVI. ASPHALT SHINGLES GUIDE SPECIFICATIONS

- A. The Guide Specifications for shingles include the “**Warranty Information**” form. Specify the manufacturer’s standard warranty for these materials. Do not submit to shingle manufacturers.
 1. 07 31 05 - Fiberglass 3-Tab, 25 Year
 2. 07 31 07 - Fiberglass Laminated, 30 Year
 3. 07 31 09 - Fiberglass Laminated for Salt Domes

XVII. DESIGN REQUIREMENTS FOR SHINGLES

- A. For All New Construction: **Minimum Slope:** 4/12.
- B. Design valleys either open with non-corroding metal, or closed cut shingles. Woven shingle valleys are not acceptable.
- C. Existing Construction:
 1. Slopes between 3/12 and 4/12: Specify ice & water dam sheet in lieu of felt paper over the entire roof.
 2. Slopes below 3/12: Specify another type of roofing such as modified bitumen or standing seam metal.
- D. Recover Over Existing Shingles: Only if all of the following requirements are met:
 1. Only one layer of shingles in place.
 2. Existing shingles are not badly curled.
 3. The roof deck is in good condition.
 4. New shingles are available the same size as the existing shingles.
 5. The “nesting” method is used to install new shingles. Contact a CDB

Roofing Specialist for a sketch needed to prepare a detail drawing.

XVIII. ATTIC VENTILATION: **Attic Ventilation Is Critical.** Design attic ventilation to provide the following for both **new construction and re-roofing**:

- A. One sq. ft. of free vent area at the soffit or eave, and one sq. ft. of vent area at or near the ridge for each 300 square feet of attic floor space. Combined sq. ft. ratios equal one sq. ft. per 150 sq. ft. and are required by CDB.
 - 1. Insulated Nail Board:
 - a. Factory-made ventilated boards are preferred.
 - b. If the eave to ridge distance is over 40', 2" venting space is required. This may require specifying job-site fabricated sleepers and a deck.

XIX. STANDING SEAM METAL ROOFING

- A. 07 41 13 - PRE-FORMED METAL ROOF PANELS GUIDE SPECIFICATIONS
 - 1. These specifications include the **Warranty Information** form. The using agency may require a 20 year weather-tight warranty.
 - 2. Specify the Contractor's 2 Year Warranty, and the Manufacturer's longest weather-tight warranty for that system. Specify manufacturers that offer the same warranty.

XX. PRE-ENGINEERED METAL BUILDINGS

- A. 13 34 19 - Pre-Engineered Metal Buildings Guide Specifications
 - 1. The Guide Specifications for Pre-Engineered Metal Buildings include CDB Forms PBMC and PBMW. Complete the known information and include the PBMW as the final two pages of the Section. Complete the heading and submit the PBMC with plans & specs to the manufacturers. Do not print the PBMC in the manual.
 - 2. Specify manufacturers with comparable quality buildings and warranties.
- B. **Wooden framed pole buildings** are not included in the pre-engineered metal building portion of the Roofing Program. Include a "Warranty Information" form as the final page in the specification and specify the manufacturer's warranty.

XXI. UNACCEPTABLE PRACTICES

- A. Specifications or drawing notes containing "or equal" and similar statements.
- B. Specifying a single or dual source for products without approval of your written request to the CDB Project Manager.
- C. State law prohibits the purchase of maintenance items such as a square of shingles, a gallon of paint, or a carton of ceiling tile with bond funds. The using agency can make arrangements to purchase these items from the contractor.

XXII. TYPICAL PROJECT SCHEDULE

- A. Program/Analysis:
 - 1. Provide an outline of the scope of work, proposed major building components, and the roofing system to be specified.

2. By correspondence or formal meeting, the A/E, using agency, Project Manager, and Roofing Specialist agree on the roofing system to be designed.
- B. 50% Design:
1. Submit plans & specs to the Project Manager, the Roofing Specialist, and the using agency for review.
 2. After making changes required by the review, roofing specifications and plans, a self-addressed, stamped envelope, and a RSMC or PBMC are sent to the specified manufacturers. Use a current Roster.
- C. 100% Design:
1. Submit roofing plans & specs to Project Manager, Roofing Specialist, and using agency for final review and make required changes.
 2. If major elements of the roofing design have changed, resubmit to the specified roofing manufacturers.
 3. "No Exceptions" RSMC's or PBMC's from the manufacturers are required before releasing the document to bidders to avoid possible A/E error charge.
- D. Construction:
1. Observation by an A/E's representative who is knowledgeable of good roofing practices, and of the plans & specs for this project.
- E. Substantial Completion:
1. Provide the Project Manager with all warranties specified for roofing and all other components. Verify they are complete and accurate. **Note:** Put all missing warranties on the Punch List.
- F. Closeout:
1. Provide the Project Manager with all warranties that were not available at Substantial Completion.
 2. Provide correct "as built" drawings.

END Roofing Program Handbook