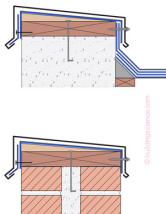


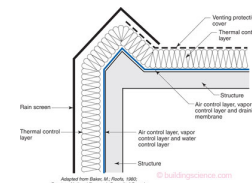
# Parapets

The easiest thing to get right about parapet construction is to keep rainwater from getting into the top of them. The principles are easy. Slope the top of them inward so they don't stain the building facade. Make sure that there is a waterproof membrane under the coping. Always. Metal and stone copings leak at joints. And always have drip edges—front and back—so that they don't stain the building facade. Did I mention the staining of the building facade? Check out Figure 4 and Photograph 1 to see it done right. If you want to get depressed, look at Photograph 2.



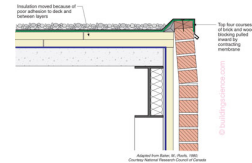
**Figure 4: Parapet Water Management**—Keep rainwater from getting into the top of them. Slope the top of them inward so they don't stain the building facade. Make sure there is a waterproof membrane under the coping. And always have drip edges—front and back—so they don't stain the building facade.

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**Figure 5: Parapet Physics**—The “Baker Principles.” Adapted from the master, Max Baker. (I) Adapted how? I just updated the words, just the words, not the principles. Everyone relax. This is probably the most influential graphic in my building science education. When I first saw it, the lightbulb went off. Continuity of the control layers between roofs and walls is the whole enchilada.

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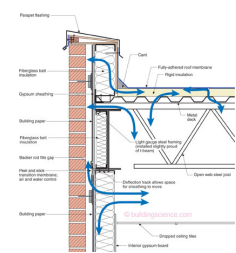
This is what we typically get in the “real world” today (Figure 6). What a mess. No continuity of the four principle control layers:

- Water control layer: no membrane under the parapet flashing;
- Air control layer: no air control in either the roof assembly or the wall assembly;
- Vapor control layer: same goes for the vapor control layer; and
- Thermal control layer: thermal bridging everywhere.

**4 Principle Control Layers**

Water control layer: membrane under the parapet flashing;  
 Air control layer: no air control in either the roof assembly or the wall assembly;  
 Vapor control layer: same goes for the vapor control layer; and  
 Thermal control layer: no thermal bridging anywhere.

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**Figure 6: Problem Parapet**—This is what I see on a regular basis. Everything is wrong. Air leakage into and out of everything and everywhere. No membrane under the parapet flashing. No air control in either the roof assembly or the wall assembly. No vapor control layer and thermal bridging everywhere.

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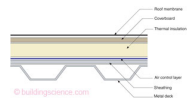
**Fig 6—Problem design/construction**

This is what we typically get in the “real world” today (Figure 6). What a mess. No continuity of the four principle control layers:

- Water control layer: no membrane under the parapet flashing;
- Air control layer: no air control in either the roof assembly or the wall assembly;
- Vapor control layer: same goes for the vapor control layer; and
- Thermal control layer: thermal bridging everywhere.

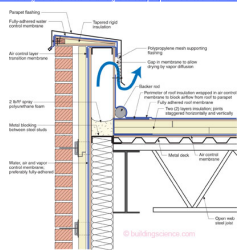
Transferring loads in multilayer compact roofs is quite controversial. There are lots of opinions, and I want to point out right from the start that only I am right. Let's start out in the field of the roof. This is how a compact roof would be constructed if I was in charge (Figure 11). There should be a continuous fully adhered air control layer supported by gypsum sheathing on the top of a metal deck. The gypsum sheathing is screwed to the metal deck. There should be a whole bunch of rigid thermal insulation on the top of this air control layer—in two layers at least with the joints offset horizontally and vertically. This insulation should be screwed down to the metal deck. Then on top of the rigid thermal insulation there should be a coverboard. This coverboard is also screwed down to the metal deck. Finally, a roof membrane is fully adhered to the coverboard.

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**Figure 11: Perfect Compact Roof**—The roof I would build if I were in charge. A continuous fully adhered air control layer supported by gypsum sheathing on the top of a metal deck. The gypsum sheathing is screwed to the metal deck. Rigid thermal insulation on the top of this air control layer in two layers at least with the joints offset horizontally and vertically. This insulation should be screwed down to the metal deck. Then on top of the rigid thermal insulation there should be a coverboard. This coverboard is also screwed down to the metal deck. Finally, a roof membrane is fully adhered to the coverboard.

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**Figure 14: The Balloon Framed Steel Stud Parapet**—This is the ugliest parapet to get right. Notice the use of spray polyurethane foam, the high density stuff, to provide air control continuity across the balloon framed exterior steel stud wall. The spray foam is supported by horizontal bridging or metal blocking. This is a tricky thing to execute and as such, we design into the upper parapet assembly a pathway for drying via diffusion to provide some performance redundancy.

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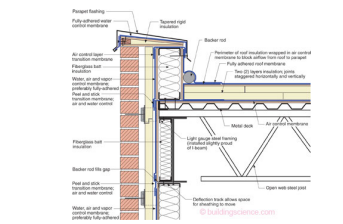
All of the “good” series of parapet details presented below the “Baker Principles” and a little bit of other stuff (Figure 12a, Figure 12b, Figure 13, Figure 14, and Figure 15):

- Water control layer continuity: membranes continuous under the parapet flashing;
- Air control layer continuity: an air control layer in the roof assembly is connected to the air control layer in the wall assembly;
- Vapor control layer continuity: a vapor control layer in the roof assembly is connected to the vapor control layer in the wall assembly;
- Thermal control layer continuity: the thermal control layer of the roof assembly is connected to an effective thermal control layer in the wall assembly. The thermal control layer in the wall assembly is exterior to the structure—just as in the roof assembly.
- The roof membrane is fully adhered to a coverboard that is mechanically attached to the structural deck in the field of the roof and an allowance for membrane movement is provided at the perimeter of the roof assembly.

The perimeter of the roof assembly insulation is wrapped to prevent interstitial airflow from the parapet into the multilayered rigid insulation of the field of the roof.

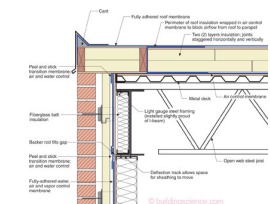
The cure for “parapets” is continuity of the control layers and letting things move when they have to move. Max Baker and StoneWall Jackson would be proud.

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**Figure 12a: Steel Stud Parapet “New Pups”**—Large backer rod supporting a bunch of extra membrane that lets things move when they have to move. The “Zor” approach to membrane movement. Use a more dimensionally stable membrane and then let things move when they have to. Again, notice the continuity of the control layers.

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**Figure 15: The Cantilevered Mini Parapet**—Notice that air control layer continuity is achieved by wrapping the membrane over the building corner and then constructing the cantilevered portion of the parapet over the top of this air seal.

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