

Rooftop Decks

FOR COASTAL HOMES



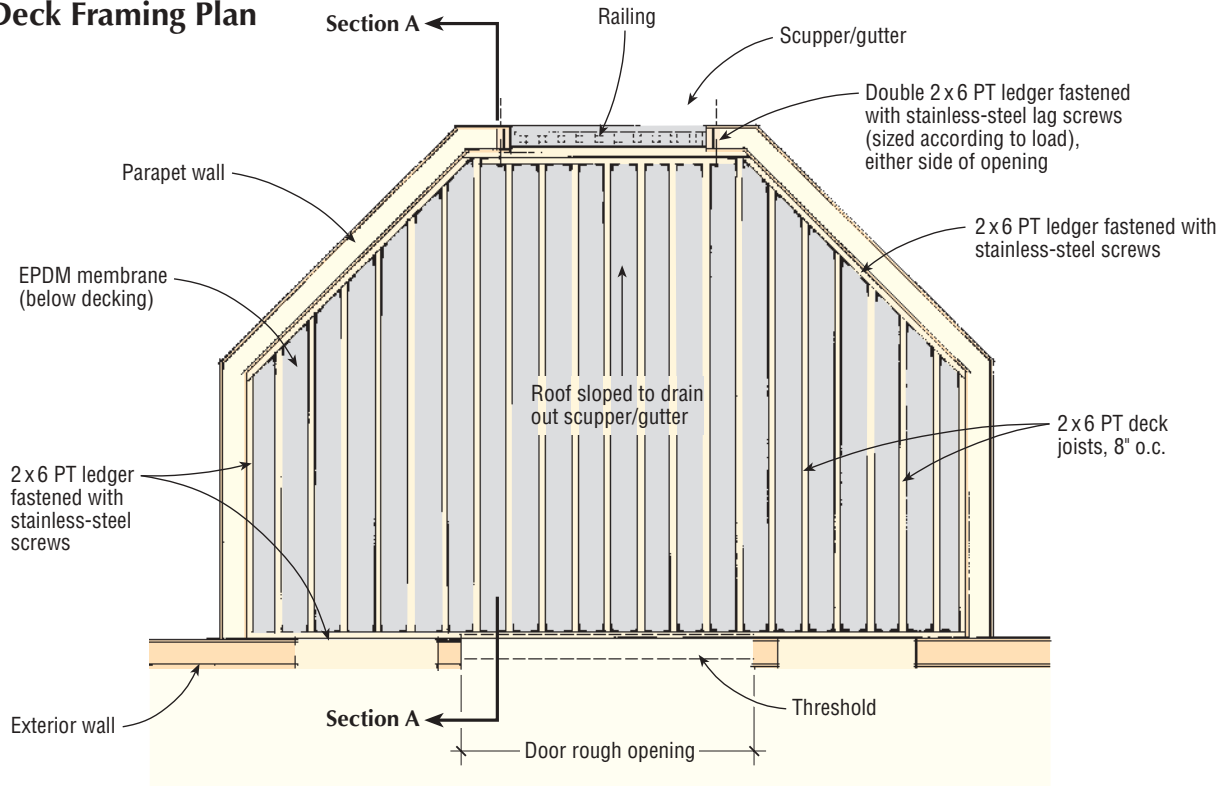
Parapet walls enclose and support the deck frame, while a water-tight rubber roof protects the living space below

In the coastal area where I design and build homes, it's often important to make the most of the views, light, and breezes that a shoreline site offers. Many times, I find that a high deck is the best way to reveal a beautiful ocean view, or perhaps just to catch a glimpse of the water over dunes or neighboring buildings.

Working primarily in the Shingle Style, which typically involves a lot of dormered spaces under roofs, I often end up setting those decks into the roofline above a lower-story room. It's also convenient in many cases to build a deck on top of one of the many-sided projecting rooms I like to use for catching light, views, and oceanside breezes. In house after house, I've found that a deck sitting on a roof provides a lot of value for the owner. It makes sense to me,

Suspended Rooftop Deck

Deck Framing Plan



Section A

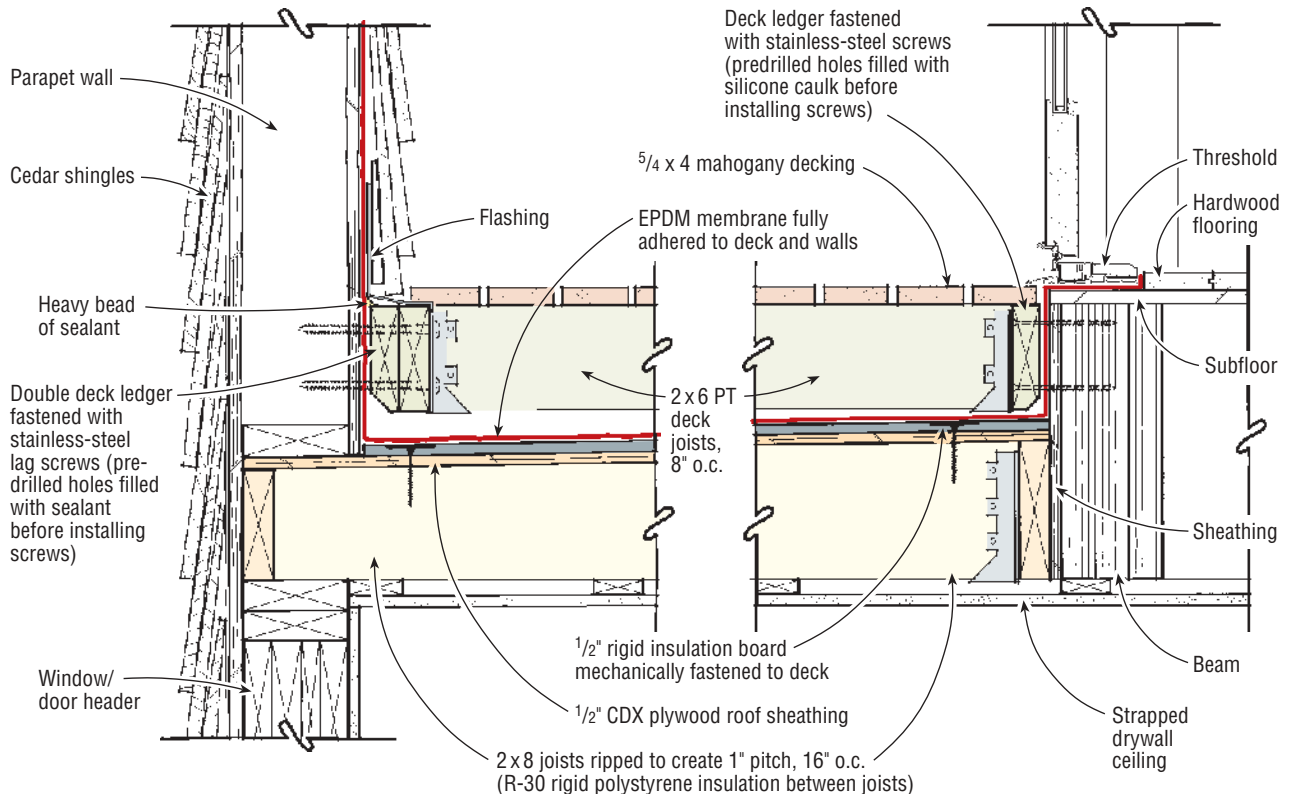


Figure 1. The author's design for rooftop decks protects the structure and living space of the room below with a continuous EPDM roof. To allow free drainage and protect the roofing, the deck frame is suspended from the parapet walls.



Figure 2. The ceiling joists of the room below the deck are ripped to provide a slight pitch away from the house, then sheathed with 1/2-inch plywood (left). Strapping helps ensure a flat drywall ceiling (below).



in light of my own experience, that the “widow’s walk” has been such a popular element on homes in this area through the years.

When I started to use rooftop decks more than 12 years ago, I looked around at some examples built by others. EPDM rubber membranes make an excellent low-slope roof covering, and it’s not hard to build a deck sitting on sleepers that rest on the membrane itself; but I’ve never liked that method. For one thing, the sleepers tend to compress the foam-board underlayment used for those EPDM systems, creating a slight trough or depression in the roof surface. And they tend to dam up the water that should flow freely off the roof. Debris and grime quickly start to collect in the low spots around the sleepers and, after a few years, accumulate on the roof just below the walking surface.

To avoid those problems, I worked out a design that suspends the deck frame an inch or two above the rubber roof, supported by parapet half-walls that rise above the roof plane as a continuation of exterior or interior house walls (see Figure 1, previous page). That way, the deck structure never contacts the roof surface at all — instead, a continuous drainage space lets water (and dirt) flow freely off.

On the other hand, the deck still shades the watertight



Figure 3. Half-height parapet walls framed on top of the sheathed roof (below) enclose most of the deck area, with just a small front panel left open (above). The front opening will receive a cedar railing and will be provided with roof-edge flashing, draining into a painted and copper-lined wood gutter.



EPDM surface and protects it from damaging sunlight. That extends the service life of the rubber (which is good for 30 years or more, even when it isn't shaded). I've built at least 25 roof-and-deck combinations using this design over the last dozen or so years, all exposed to harsh seaside conditions that can eat the enamel off a doorknob in about three months — and I haven't had a single callback.

For an example of how it's done, I'll use the deck we installed over a bumpout room on the same Rhode Island custom home that I described in "Shearwalls for Coastal Homes" (2/04). On that house, a projecting octagon room facing the ocean served the design in several ways: It efficiently opened up interior space; it provided nice views, light, and air; and it also helped to stiffen the house frame against coastal windstorm forces. With parapet walls, a rubber roof, and a deck assembly placed above it, the room serves yet another function: It supports a protected but open upper-story deck, graced with a nice view and plenty of sunshine.



Figure 4. A roofer lays out the specified fasteners for the rigid-foam underlayment (left). After the screws are driven in (below), the EPDM is adhered to the deck (bottom).



Roof Framing

The room's roof framing, which is also the ceiling framing for the room below, really resembles a floor frame more than the usual roof frame (Figure 2, page 3). The house walls do the work of supporting the above-roof walking deck, and the deck framing itself is sized to carry the design dead and live loads for our area, including snow loads. So although it is capable of considerably more, the roof-ceiling frame for the room isn't actually subjected to loading much beyond its own weight. Depending on the dimensions of the space, I'll use 2x8s or 2x10s for joists, with 1x4 strapping on the underside and 1/2-inch plywood sheathing on the upper side. We rip the tops of the joists to provide a pitch of about an inch, creating a gentle slope away from the house.

Parapet Wall

We frame the parapet wall with 2x6 plates and studs, and sheath it on both faces with plywood (Figure 3, previous page). It supports the deck and also serves in place of a rail-

Figure 5. At right, the roofing contractor rolls adhesive onto the back of the EPDM in preparation for covering the parapet walls. Lapping and seaming the rubber into wall openings and at intersections and transitions creates a continuous watertight drainage plane capable of protecting vulnerable points in the building envelope against brutal oceanfront weather.



ing; it needs to be high enough so that when the depth of the deck framing and decking is considered, the wall cap will reach the required height for a deck rail. Because the roof edge it sits on is sloped away from the house, the studs for the wall have to be individually measured and cut to the proper length, so that the wall height will be uniform above the level walking deck.

The main room walls beneath the parapet walls are mostly full of windows and doors. The headers in those openings are sized to support both the uppermost deck, with its allowable live loads from snow and people, and the more lightly loaded lower-room ceiling frame.

Rubber Membrane

EPDM roofing is a known quantity, with billions of square feet in service and decades of accumulated installer experience. There are several ways to attach EPDM to roofs in the commercial market; for our jobs we use a fully adhered system. First, we screw a rigid insulation board to the plywood roof sheathing, then we apply adhesive to the foam board and lay the rubber over it (Figure 4, previous page).

It takes several pieces to completely cover the whole shape of our roof and its parapet walls; seams are formed according to manufacturer specifications, with either applied adhesive or a special seaming tape. We also run the rubber



Figure 6. The crew first bevels the back of the ledger (below) to promote free drainage around the edges of the deck. Because the roof surface slopes, the ledger board has to be leveled — the drainage space gets wider toward the front of the roof.

roofing up the main house wall and into the rough window and door openings — when all the seams have cured, we’re left with one continuous, integrated waterproof membrane protecting not just the roof, but also all the vertical walls around the deck, as well as the main house wall and its rough openings (Figure 5, previous page).

The contractors I use for my rubber roofs come out of the commercial roofing industry, of course — that’s where most EPDM is used. These little jobs are attractive to them, however: They can make good money on a weekend, and some of my smaller roofs they could just about cover with scraps left over from one of their regular commercial low-slope roofing jobs.

Deck Frame and Decking

I build my deck frames with pressure-treated southern yellow pine (Figure 6). We fasten the ledger to the parapet wall with lag screws sized to more than handle the load. We predrill for the lags, and before we send in the screws, we fill the drilled holes with a manufacturer-recommended caulking that’s compatible with the EPDM membrane (Figure 7, next page). That completely seals those holes, so water won’t get into the wall structure where the screw penetrates the rubber. We caulk the top edge of the ledger to keep water from getting behind it.



Figure 7. A heavy bead of sealant keeps water from getting behind the ledger (right). The crew also puts sealant on the back of the ledger (below) before screwing it into place. Depending on the loads, lag screws driven into predrilled, precaulked holes may be added for structural support.



For decking boards, I prefer to use a heavy, durable, rot-resistant tropical hardwood. I've used mahogany on some of my older decks, and currently I like to use Ipe. Alternatively, I'll use a plastic composite decking material such as Trex. I don't ever use treated southern yellow pine for decking. It doesn't deteriorate, but I've found that the juvenile wood, with its flat grain, twists, checks, and splinters, just isn't suitable for my projects.

One caution to keep in mind: Coatings commonly used on wood decks may contain solvents that will eat through EPDM. I always warn my clients that they can't apply an oil-based stain to their deck, unless they want to burn big holes into their roof. I prefer to use lumber that's naturally resistant to weather and rot and needs no stain, but if the customer wants a deck stain, we pre-stain the wood before we install it.

Also, I often assemble my deck frames in smaller panels, or modules, that can be unfastened and lifted out in sections if the deck needs recoating, or, more important, if the roof membrane has to be repaired or modified. Sometimes we fasten our deck hangers to the ledger, or even send the fasteners for the hangers all the way into the framing of the parapet wall; but instead of fastening the joists into the hangers in the usual way, we just set the joists into the stirrup of the hanger and put a hold-down strip across the top. That way, someone can remove the strip later and lift the joists up out of the hangers, if need be — the deck comes free in panels.



Figure 8. Deck joists are first screwed into place, with hangers added after.

Once we installed a large deck over the entire top of a mansard-roofed house in a hurricane zone; in that case, I let a beefy center shearwall extend up through the roof to support the center of the deck, suspending the ends of the deck from the sides of parapet walls in the more usual way. That deck was assembled in panels as I've described, with the decking nailed on in a herringbone pattern. The panels were set into their joist hanger cradles, and a wide deck board placed across the support wall covered the joist ends on both sides and held the whole assembly in place. If necessary, the panels from one side can be lifted out and set down on the other half of the deck, to provide access to the roof membrane

Railing

If I'm putting a deck over a rectangular room, I'll suspend the deck frame between two half-wall side parapets and run a railing across the whole front opening. More commonly, though, the deck rests above an 8-sided or 12-sided room. In that case, we frame up the parapet walls around almost the whole circumference of the polygon, as we did in the example shown here, and we frame the deck with joists running from the main house wall out to the parapet half-walls. With the roof itself pitched gently toward the outside, the angling polygon half-walls naturally catch the rainwater and funnel it toward the outermost segment of the polygon. There, we leave a gap and install a railing



Figure 9. A cedar rail will finish off the opening at the front of the deck (right). The copper flashing will drain runoff from the roof surface into a copper-lined wooden gutter. The author sometimes uses scuppers to carry the runoff into a gutter, as in this small deck with a plexi-glass rail, below. Note the height of the scuppers, which are at roof level, relative to the decking.



across the opening, letting the rainwater drain out over a copper drip-edge and into a gutter (Figure 8, previous page). Or, sometimes, I will close in that wall as well, installing just one or two scuppers for drainage.

Scuppers and Gutters

We have copper scuppers custom-bent at a metal shop for each job, and we let the roofer attach the membrane to the metal. Then we drop the metal right into a fir gutter. I like to use wood gutters, because they look like a piece of the woodwork — almost like a cornice or a piece of crown molding. You can get fir gutter stock at most lumberyards, but if appearance is critical, I order it from a specialty supplier who carries high-quality material. We always preprime and prepaint the gutter before installing it, and we line it with copper. The big key is to make sure that you space the gutter away from the fascia when you attach it (Figure 9). We use stainless-steel screws to fasten the gutter to the fascia, but we attach it through predrilled spacer blocks of pressure-treated plywood (sawn lumber would be more likely to split).



Andrew P. DiGiammo is a design-build contractor and a partner in an architectural firm in Assonet, Mass.