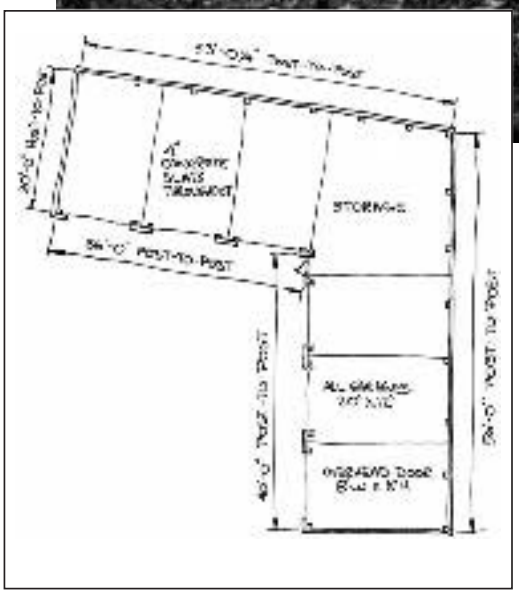

Posts on 8-floor centers allowed economical use of standard lumber sizes. Vinyl siding was used on front and gable ends for a traditional appearance.

A POLE BARN WITH STYLE

HOW TO BUILD A LOW-COST POLE BARN WITH HIGH-CLASS LOOKS

by Richard Cooley

I decided once and for all that this year I would build a storage building for myself. The decision became final when I crawled into my pickup bed looking for a drywall gun. My truck has a cap, and the front two feet of the bed collects the debris that gets plowed up from the area near the tailgate.

I didn't find my drywall gun, but under two canvases and a tangle of leads and ropes, I did discover many other long lost goodies. I found my Makita palm sander, my favorite Marshal-Town curved taping trowel, a shingle sampler, a top bracket to a pump jack, a come-a-long, a bottle of air-gun lube, and many other less notable items. "We're building a barn this year," I called out to my crew.

We had built several pole barns over the years. I was impressed with their versatility, speed of construction, and relatively low material cost. I had also found that many municipalities, including mine, assessed them for taxes at a lower rate than conventional buildings. Also, the building site I planned to use had conditions that made a conventional foundation almost impossible.

Site Considerations

On any job, careful consideration of the site is time well invested. At one time, this site had been a transfer yard for heating coal. What was now a bike trail had at one time been railroad tracks. There were various piers for coal chutes, remains of building foundations, and deep down we even discovered a granite cobblestone road base. The cobblestone proved to be impenetrable even with a backhoe, but fortunately it was 4 feet below our final grade. Otherwise, when the backhoe hit something, we would simply trench next to it and slide it over to allow for our piers.

Installing the Piers

I decided to use concrete piers at this site instead of sinking the poles themselves for three reasons. First, the site had poor-draining soil, and w planned to pour a concrete floor right around the piers. This makes hostile conditions for wood, treated or not, so it was best to use concrete piers below grade.

Second, I needed to bring in some clean fill sand. A backhoe could grade

the sand right over the piers. Poles would have been hard to work around. The sand not only brought the area up to a level grade, but it also provided a good drainage base for the slab floor. Good drainage is the key to a stable slab poured on grade.

Finally, piers don't have to be set exactly in a straight line like poles. We could make the final adjustment when we set the anchor bolts in the concrete. The piers could actually be off a few inches one way or another, as long as the bolts were set true to the string lines.

We used 12-inch cardboard Sonotubes for forms. The advantage of using cardboard forms is that you can leave them sticking out to rough elevations and cut them off later. After we backfilled, we marked them using a dumpy level and cut them off to the desired level before we poured.

Attaching the Poles to the Piers

We set the piers 8 feet on-center. This made for a header span that could be handled with two 2x12s. the trusses were designed for a 50-pound-per-square-foot load, and a double 2x12 header on the 8-foot span was rated higher than that. Also 8-foot centers make good use of standard 16-foot lumber for wall purlins.

I used 4x6 treated poles. I wanted the 6-inch dimension on one side so that I could notch in my headers. (the 4x6 poles are better than 6x6s, because they're easier to handle and cheaper.) Since the poles weren't in contact with the concrete and were not exposed to the weather, we could have gotten away with pine or something else untreated. But untreated poles are harder to come by. It's not a stock item inmost lumber yards, so you won't save much unless you can find them at a small mill.

To attach the poles to the piers we used a conventional galvanized-metal post-anchor box. They are a standard item at a lumberyard. These anchor boxes bolt to the pier and nail into the bottom of the pole. They also hold the pole an inch or so off the concrete, which further discourages rotting (see Figure 1).

We stood and temporarily braced the poles. We marked them with the aid of the dumpy level. I didn't assume the bases of the posts were level with each other. After marking the posts with a level line, we could measure off them to lay out our header notches and form our concrete floor.

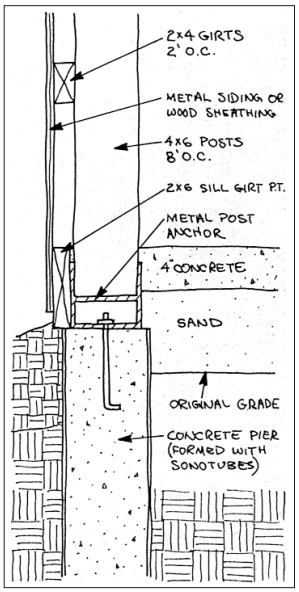

Figure 1. *On this site, the author found concrete piers more convenient to use than poles. The piers could be laid out with less precision, and they let the backhoe grade a layer of sand right over them.*

Framing and Trusses

We built the headers out of two 2x12s and boxed them top and bottom with 2x6s (see Figure 2). The 2x12s were notched into the poles. This is more dependable than any mechanical fastening system. It doesn't rely on the strength of the fastener or the fastener's ability to hold in the wood. Also, there's no chance of the 2x12 splitting at a fastener.

It is best to run the top 2x6 continuously across the tops of the poles. It adds rigidity and makes for a good top plate to nail trusses to.

Trusses designed for 40foot centers cost about $40 each. We needed 28 of them. Trusses designed for 20floor centers were about $28 each, but we would have needed almost twice as many. So we used the 4-foot-on-center trusses and saved about $500.

Figure 2. *Double 2x12 headers are boxed in with 2x6s on the top and bottom. The 2x12s are notched onto the poles for a solid joint with no chance of splitting.*

Figure 3. *Three trusses are ganged to make a bearing beam at the inside corner of the building. Trusses with their tails cut off hang from the beam with joist hangers.*

We nailed three trusses together to make a bearing beam at the inside corner of the building where the building turns 90 degrees, making an ell. The header allows this area to stay open underneath. We cut the tails off the trusses here and fastened them with joist hangers (see Figure 3).

We used Fink trusses with an open triangle down the middle so that we could store aluminum ladders and what-not in this space. We installed a hatch door in the gable to gain access to this area.

For purlins (roof supports nailed across the rafters) and girts (horizontal supports nailed across the posts), we used 2x4s every 2 feet on-center. On the bottom of the walls, we used a treated 2x4 that doubled as a concrete form. This bottom 2x, called the "sill girt," is partially buried to seal the building at grade (detail in figure 1).

> The biggest enemy of a pole barn is wind, because it has a large surface area and a relatively small mass.

Watch for Wind Racking

The biggest enemy of a pole barn is the wind, because it has a large surface area and a relatively small mass. This mass-to-surface ratio may be good if you're designing an airplane, but it's bad for a building that you want to keep on the ground. Everyone has seen the remains of a lawn shed after it has blown across the yard. For poles stuck in the ground or fastened to piers, this isn't the immediate problem. The problem there is with racking, the constant shifting action from wind gusts.

Wind can cause the building to move enough to loosen the sheet metal, cause leaks, and eventually loosen the panels. Wind can also stretch nail holes in the sheet-metal roof and siding. (The nails come loose with time anyway, and the gaskets on the nails can deteriorate.) Our site was well protected from the wind, but we still took all precautions.

Bracing For Wind

With conventionally framed buildings, plywood sheathing braces the building. With pole barns, which lack rigid sheathing, this bracing must be added. Two areas of our building – the bottom storage area and the trussed loft space – needed to be braced in three different planes or "dimensions." For the bottom part of the building, this meant bracing the length of the storage area.

Along the length of the building, it's easy to install diagonal bracing on the exterior walls. That's the first dimension. Across the ceiling or top of the

Cost Breakdown
Excavation and Backfill

Eight hours backhoe at $45/hour	$375
Fill sand: 70 yards at $8/yard	560
Sonotubes: Ten 12-foot tubes	150
Concrete for piers: Four yards 2,000-pound mix	250
Poles: 32 pressure-treated 4x6s	450
Headers: 320 lineal feet 2x12s	300
320 lineal feet 2x6s	125
Trusses: 28 Fink trusses	1,200
Purlins: 200, 16 -foot 2x4s	700
13 pressure-treated 2x4s	75
Ribbed Steel: 3,600 square feet (see article for breakdown)	1,800
Valley and ridge material:	250
Fascia: Two rolls, 24 inch x 50 feet, 019 alum.	130
Soffit: 170 square feet vinyl	
340 lineal feet "j" channel	225
Sheathing: Ten sheets $^1/_2$-inch aspenite	75
Vinyl siding: 320 square feet, including trims	350
Concrete slab: 24 yards, 3,000-pound mix	1,500
Overhead doors: six installed	2,400
Exterior steel door with glass	180
Total material cost for completed exterior and poured concrete floor	$11,095

storage area, you can easily brace diagonally along the bottom of the trusses. That's the second dimension. Bracing for the third dimension stabilizes the depth of the building, so this bracing must go across the building. The end walls stiffen the building's ends. But the middle can be a problem, because the bracing must go through or into the usable space. Since we divided the building into several stalls, however, that wasn't difficult for us. If you want the building open in the middle, which is common, you have to put knee bracing at each pole. If it's kept high enough, it won't cut into the usable space of the building too much.

You need to brace three dimensions of the trussed area as well. The bottom of the trusses (the storage area ceiling) was taken care of when we braced the top of the storage area. That's the first dimension. The other two dimensions – length and depth – can be braced at the same time since the angle of the roof crosses through both. Simply put diagonal bracing inside the truss and fasten it against the underside of the rafters (see figure 4).

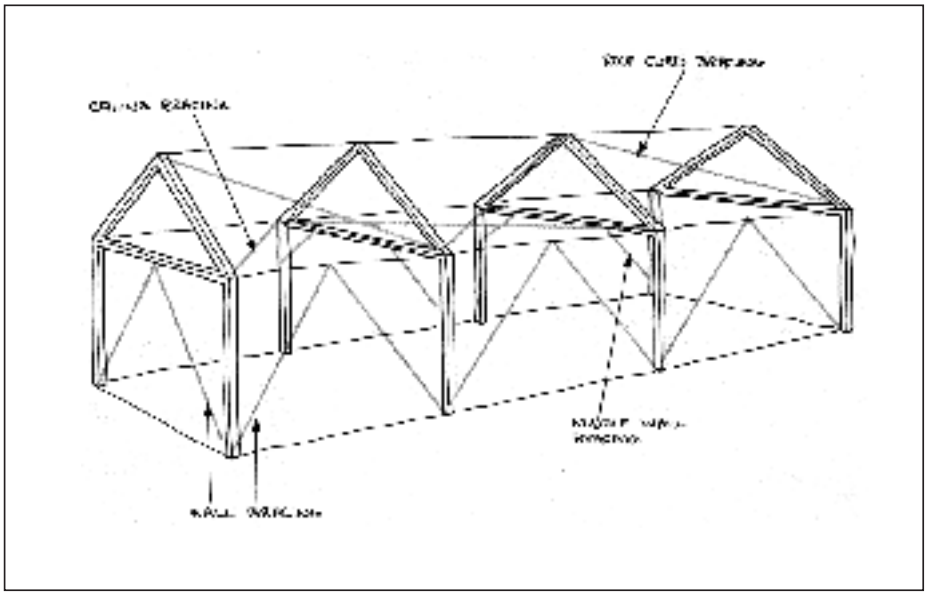

Figure 4. *With conventionally framed buildings, plywood sheathing braces the building. Pole barns lack rigid sheathing, so bracing must be added throughout the structure.*

Galvanized Roofing and Side Panels

Twenty-nine-gauge bold-ribbed galvanized metal roofing seems to be the standard. It comes either painted a variety of colors or "mill finished," which is plain-galvanized metal. Both are generally warranted twenty years maintenance-free. They may be repainted after that.

The painted metal sells for about sixty cents a square foot, and the mill finish sells for about forty cents a square foot. Because the front of the building was in view, we used the red metal on the roof there. On the back of the roof and the back sides of the building we used the mill. We needed about 3,600 square feet of metal. We used 1,100 square feet of the red and 2,500 square feet of the mill. We saved $500 doing it this way, and it gave me a very attractive façade.

The panels are stocked in most lumber yards in 2-floor increments, from 10 to 16 feet. Longer panels —up to 40 feet – can be ordered, and custom cut to length. Panels cover 3-foot widths. When designing a pole barn, it's wise to work around stock lengths, and plan on little or no cutting. The metal can be cut with a fiber blade.

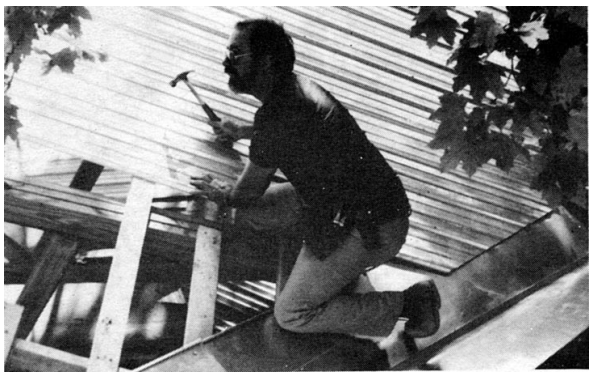

Figure 5. *Metal roofing is installed with ring-shanked gasketed nails driven in the ridges, not the troughs. The valley was custom-fashioned from 26-gauge galvanized steel.*

Use standard 2-inch ring-shank gasketed nails, available at most lumberyards. They come galvanized, or colored to match the steel panels. Nailing must be done along the ridges (see Figure 5), not in the troughs. This may seem elementary, but I was called to look at one leaky metal roof and found that the installer had nailed it in the troughs.

Siding

This building had about 1,800 feet of wall surface to be sided. It would have taken two men about eight hours to cover this area with sheet metal. If I had conventionally sheathed and sided it, even with vinyl, it would have taken three times as long. We ended up doing about 20 percent with sheathing and vinyl – the section you see from the street.

There's a gasket for the back side of the metal to make it airtight here too. The gaskets are available with adhesive on them for ease of installation. I used conventional vented vinyl soffit and aluminum fascia. We bent up the fascia out of roll stock.

On gable ends, when I'm not using an overhang. I always place the fascia board out 1 _ inches. In this case, I used a 2x4 spacer, and a 1x6 rough-pine board covered with aluminum. It's quick and easy to run siding up behind the fascia with this system (see Figure 6). It works well for cedar siding and fascia as well. It adds a rich looking shadow to an otherwise inexpensive trim.

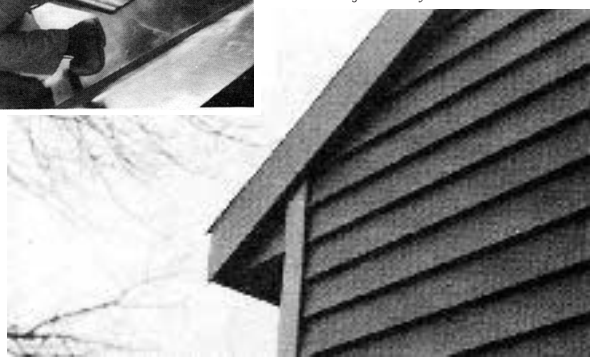

Figure 6. *One-by-six rough pine, blocked out with a 2x4 spacer, makes a simple, attractive rake board. The siding tucks easily underneath.*

A Pole Barn's Uses and Advantages

I love the versatility of a pole-barn structure. I did a horse barn with bevel-cedar siding that looks like a classic colonial structure, another storage barn I did with rough pine board and batten. I've done conventional steel buildings that were open on one side, and for myself I made a hybrid.

The greatest advantage is in the foundation costs, but also important is the speed of construction. We took about three days for two men to get the piers in, and another ten days for three men to finish the exterior and floor, including the metal bending. (the overhead doors I subbed out.) Not bad for an 1,800-square-foot building.

There's also material savings, especially on the roof, a maintenance-free exterior for at last 20 years, and often a property tax savings. Also, by simply studding out the exterior walls and strapping the ceilings, you could insulate and put up drywall. It would make a great space for heated storage or shop space too.

For More Information…

Two useful books are available on Pole Building Construction. Pole and Post Buildings: Design and Construction Handbook, costs $3.50 from The Cooperative Extension at the University of Massachusetts. Write them at the Agricultural Engineering Building, U. Mass. Amherst, MA 01003. Also, Practical Pole Barn Construction, by Leigh Seddon, costs $9.95 from the Williamson Publishing Co., Charlotte, VT 05445. ■

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