THIS PUBLICATION brings you a different concept of presenting farm-building plans. From the illustrations of the basic details of the pole-type construction described, you can develop plans for many combinations of suitable farm buildings.

The basic details, the 18 cross-sectional combinations, and the 6 complete building plans are the results of two years of research and development by the author at the Oregon Agricultural Experiment Station.

"Multicomination pole-type construction" gets its name from the feature that the few standard, detailed parts can be assembled into many combinations of buildings. Other features include: installment building, use of rigid-pillar construction, low-grade lumber, many types of roofing and wall materials, strong joints, and easy economical assembly.

Poles are spaced 14 feet apart lengthwise, and either 14 or 24 feet crosswise.
Features and Limitations

This bulletin introduces multicombination pole-type construction which has the following features:

1. A few standard, detailed parts which can be made into many different building sizes and shapes. This allows the supplier to handle a small number of materials that can be assembled easily into a "package" for many different buildings.

2. Some buildings using this type of construction can be built by installments. See page 19. The building can be:
   - expanded as it is needed.
   - built as labor is available.
   - paid for by installments.
   - used as it is built.

3. This is a form of rigid-pillar construction. The building is attached to pillars that are set into the ground to give rigidity. Rigid-pillar construction offers:
   - little or no bracing, which allows free access in both lateral and longitudinal directions.
   - a simple order of support — roofing to purlin to rafter, to pole to footing to ground.
   - no expensive foundation walls.
   - an anchored building frame to resist upward wind forces.
   - walls only, roof only, or any combination of roof and walls.
   - no walls for roof support. A wall can be placed or removed at any time without disturbing the rest of the structure.

4. This construction has the following design features:
   - the allowable snow load is 20 pounds per horizontal square foot.
   - only low-grade lumber is required, standard (1200f) Douglas-fir or equivalent.
   - bolts, split-rings, glue, nailed-plywood gussets, bearing plates, and ring-shank nails are used so the joints can carry the load safely.
   - the 14-foot span of the 2 x 12 rafters and the 2 x 6 purlins is arranged so their full strengths as simple beams are utilized.

5. All types of roofing and wall exterior surfacing materials can be used.

6. No expensive or extensive scaffolding is needed for construction. Only ladders, step-ladders, and portable platforms are required.

This type of pole-type construction has the following limitations:

- It is not designed for two-story building use. The flooring, joists, girders, attachments of girders to the poles, longer and larger poles, and large footings required for a two-story building would cost more than the poles and roof of a one-story building for the same area.
- It cannot be used on soils in which the holes cannot be dug to the proper depth due to hardpan or rock. Shallow holes will not give the degree of rigidity necessary.
- Poles cannot be put on top of the ground on piers. In this case, the poles will have no rigidity and the building will collapse.
- Buildings should not be completely enclosed to control temperature and humidity unless they are insulated and ventilated to avoid condensation on the roof and walls.

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COVER. 42-foot open-shed gable-roof.
Round Poles

Round poles are purchased by top diameter and length, including the part that is placed in the ground. All poles to which 2 x 12 rafters are attached should have at least 5-inch top diameters, and poles on which trusses are attached should have at least 6-inch top diameters. Larger diameter poles can be used if you can obtain them for little or no additional cost.

Square Posts

Square-sawed timber posts can be used instead of poles. A 6 x 6 post should work satisfactorily for any length up to 20 feet. Use an 8 x 8 if lengths are more than 20 feet. Square posts should be incised (holes punched into sides) before treating.

Preservative Treatment

Maximum useful life of poles can be obtained and expensive repairs avoided by using only wood that has been treated in conformity with standards of the American Wood Preservers Association. These standards allow cedar poles to be treated by the hot-cold bath method while pressure treatment is required for all other pole species. Properly treated poles will contain numerous seasoning cracks and will be penetrated by the preservative for a depth of \( \frac{3}{4} \) to 1\( \frac{1}{2} \) inches or more from the surface depending on the species being treated. Deeper penetrations are usually more necessary in warm, humid regions than in cold, dry regions where decay conditions are much less severe. Treated wood can be obtained from commercial treating plants or their distributors. Home treatments seldom provide adequate protection for building poles.

Depth

How deep you sink a pole determines its rigidity to resist wind and lateral loads. Pole-type construction utilizes rigidity in eliminating or reducing the bracing normally required with other types of construction. Therefore it is very important that you follow the recommendations for depth given in Table 1.

<table>
<thead>
<tr>
<th>Pole length</th>
<th>Soft soils Feet</th>
<th>Ordinary and firm soils Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 16 feet</td>
<td>4( \frac{1}{4} )</td>
<td>4 (minimum depth)</td>
</tr>
<tr>
<td>Up to 20 feet</td>
<td>5</td>
<td>4( \frac{1}{2} )</td>
</tr>
<tr>
<td>Up to 25 feet</td>
<td>5( \frac{1}{4} )</td>
<td>5</td>
</tr>
<tr>
<td>Up to 30 feet</td>
<td>6</td>
<td>5( \frac{1}{2} )</td>
</tr>
</tbody>
</table>

Footings

With pole-type construction each pole will support a heavy, concentrated load. Under most soil conditions, this load is heavy enough to cause the poles to settle.

Since such settling is not good, we use footings to prevent it.

Two types of footings are recommended—the concrete type and the gravel type. See Figure 1. Gravel footing can be unwashed, pit-run gravel, well proportioned with fine, medium, and coarse size particles.

Footings are put in the bottom of the hole which is dug deeper than the depth of the pole.

Table 2 gives the minimum recommended footing diameters for the type of construction and type of soil. Usually, the diameter of the hole necessary to set the pole easily in the ground is enough for the diameter of the footing. In some cases, where the diameter of the hole is smaller than the required diameter of the footing, the hole can be widened at the lower end for the footing. The bottom of the hole can be rounded, does not need to be level.

After the footings have been put in place, the poles can be placed in the holes and aligned as shown in Figure 2. The poles are located at
ground level by placing a chalk line or stretching a string along one side of the poles and by measuring from the outside edge of the end pole to the center of the inner poles. The vertical alignment or the location of the tops of the poles is done by sighting through two plumb bobs. These plumb bobs should be at right angles to each other. The poles can be held in place by braces nailed to stakes or by three pike poles.

When the poles are aligned and held in place, the holes should be partially backfilled. When the roof frame has been attached, squared, and the building temporarily braced against further movement during assembly, the backfilling can be finished.

### TABLE 2. Minimum Footing Diameter

<table>
<thead>
<tr>
<th>Type of construction</th>
<th>Soft soils</th>
<th>Ordinary soils</th>
<th>Firm soils</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Soft clay, sandy loam, or silt)</td>
<td>Inches</td>
<td>Inches</td>
<td>(Dry, hard clay [hardpan]; coarse, firm sand, gravel, or rock)</td>
</tr>
<tr>
<td>All poles on which only 2 x 12 rafters are mounted, and 16-foot poles on which 24-foot trussed rafters are mounted</td>
<td>28</td>
<td>16</td>
<td>No footing necessary</td>
</tr>
<tr>
<td>20-foot or longer poles on which 24-foot trussed rafters are mounted</td>
<td>34</td>
<td>20</td>
<td>No footing necessary</td>
</tr>
</tbody>
</table>

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**FIGURE 1.** Gravel (left) and concrete footings and backfill. Crushed rock with fines is also excellent material.

**FIGURE 2.** Aligning poles by sighting through two plumb bobs. Holes are only partially backfilled until rafters are in place.
**2 x 12 Rafters**

Figures 3a, b and c show how the 2 x 12 rafters are attached to each side of the outer, inner, and peak poles. Because of the heavy, concentrated load on these joints, ⅜-inch bolts must be used. Nails alone will not hold. Use 40-penny nails to hold the rafters in place during construction until the bolts are placed. Leave nails in to help carry part of the load. Many treated poles are oily and do not hold the nails. Use a ring-shank nail as shown in Figure 6 to increase nail load-carrying capacity.

On the inner and peak pole, double 2 x 6 x 18-inch bearing plates are used to resist the heavier concentrated loads the two joints carry. The top of each plate is cut to the slope of the rafters and fitted under the rafter. The plate next to the pole is nailed with four 40-penny nails (ring-shank preferred). Nails are staggered slightly from the center line. The outer plate is fastened to the inner plate with four to six 16-penny nails. A ¾-inch bolt is placed 6 inches below the tops of the plates.

If a purlin is not placed over the top of the pole, the pole should be cut 5 inches above the rafters. (See purlin tie, 1P, Figure 12, page 11.) If a purlin is placed over the top of the pole, as in the case of the peak pole, the pole should be cut even with the top of the rafters.
Standard (1200f) Douglas-fir lumber or its equivalent is satisfactory for these 2 x 12 rafters. Either S4S (surfaced 4 sides or planed) or rough lumber can be used. For slopes 4 on 12 or less, 2 x 12 x 16-foot rafters will be required. For slopes greater than 4 on 12 or for wide eaves, 2 x 12 x 18-foot rafters will be needed.

Figures 3a and 3c show two methods of lapping the rafters. Use the method that will make the rafters most nearly parallel.

**Peak 2 x 12 Rafters**

When it is desirable to have the peak or ridge of the building come between poles, the peak can be made on the 2 x 12 rafter as shown in Figure 5. This peak rafter is fastened to an inner or outer pole in the same manner as a straight 2 x 12 rafter. Two methods of fabricating the peak joint are shown. One uses a 2 x 12 x 4-foot collar splice. This is fastened by four, 2 1/2-inch, split-ring connectors and 3/4-inch bolts and washers. See Figure 11 for the installation of split-ring connectors. The other peak joint uses one 1 x 12 x 4-foot collar splice on each side. This is fastened by resorcinol-resin glue and nails. See page 9 for the application of glue.

**Aligning and Attaching Rafters**

There are two methods of aligning the rafters to the poles. In the first method, see Figure 4, marks on top of the rafter are set in alignment to corresponding marks on the poles. The marks on the rafter represent the slope length of the rafter for the 14-foot horizontal span. On an inner pole, the mark on top of the rafter is set up to the nail marker on the center of the pole touching the rafter. On an outer pole the mark on the rafter has to be aligned to the nail marker on the outside edge of the outer pole. This can be done by nailing a 1 x 6 x 16-foot board on top of the nail markers on two outer poles lengthwise to the
building. Then the inside lower edge of the 1 x 6 is the mark to which the mark on the rafter is to be aligned. Nail markers on all inner and outer poles are set at the height that the top of the rafter should be above ground level. For this first method, care must be used in aligning the poles when they are placed so that their centers or outside edges form a straight line in the lengthwise direction of the building. If any are out of line, a brace from the pole to a stake in the ground can be used to hold the pole in line until the roof is in place. Sometimes when the hole is partially backfilled the pole can be tilted until it is in proper alignment.

The second method requires that the end rafters be placed by the first method described. Then a string can be stretched between them, and the remaining rafters placed to the string. When a rafter is aligned, nail it into place by three 40d ring-shank nails at each pole.

After all rafters are nailed in place, tack 2 x 6 x 14-foot purlins on top of the rafters near each row of poles to properly space the rafters and poles lengthwise. Then, square and brace the building, and finish backfilling the holes. The poles will be held firmly while the bearing plates are nailed and the holes for the bolts are drilled.

A 5-inch board tacked to the pole above the rafters can serve as a guide for a chain or hand saw when cutting the tops of the poles. All bolts should be retightened after the roof has been on 6 months, and the lumber has dried.

**FIGURE 6. Ring-shank nails. These nails have a higher withdrawal resistance than smooth-shank nails.**

**Bracing**

Pole-type construction is braced by the rigidity of the poles set deep in the soil, the stress action of the walls and roof, and additional braces.

The bracing effect of the poles set in the ground will prevent the building from collapsing. Without any other bracing, the roof will have some sway. The bracing effect of the walls and additional bracing will reduce or eliminate sway.

Usually, additional bracing is not necessary. If it is required, however, add lateral bracing as shown in Figure 7. Bolt the 2 x 4 braces to the pole with a long ½-inch bolt. Add short ½-inch bolts through the 2 x 12 rafters and braces.

If lengthwise bracing is required, an "X" brace between the tops of the poles can be made by fastening 2 x 6 x 18-foot pieces with ½-inch bolts or lag bolts. This bracing may be required only between the end and second poles.

Bracing by increasing the rigidity of the poles can be done by using larger diameter poles, setting them deeper in the soil, and by placing a concrete floor slab around the pole at ground level.

The silo wall, page 18, helps increase the bracing effect in the lengthwise direction.
Rafters can be trussed to eliminate an inner row of poles. Figure 8a shows a detailed drawing of a 24-foot trussed rafter.

At the heel joint where the largest stresses occur, nailed plywood gussets are used. These gussets are made from 4/8-inch, exterior-type, Douglas-fir plywood, CC grade, unsanded. If this is unavailable, other grades of 4/8-inch, exterior-type plywood may be used.

Build the truss from standard (1200f), Douglas-fir lumber or equivalent. The lumber may be S4S or rough. If you use rough lumber, move the gusset 6 inches inward, as shown in the upper left corner of Figure 8a. In a truss made of S4S lumber, the plywood heel gusset is nailed with 8-penny nails, while 10-penny nails are used for rough lumber trusses.

The other joints in the trusses are fastened with 2½-inch split-ring connectors. (See Figure 11.) The split-ring connector is much stronger than bolts or nails, and is needed in this truss where strong joints are required.

Figure 9 shows how two 24-foot trussed rafters are attached to a pole, and how the purlins and ties are attached to the trussed rafters.

The trusses are tied together by the purlins and ties on the top chord and by 1 x 6 ties on the lower chord and knee brace. Note that the knee brace is not fastened to the lower chord. This is to allow the brace to slip by the lower chord when the truss is deflected under load.

Retighten nuts after the trussed rafters have been covered for 6 months to 1 year. The best time to do this is in the late summer when wood is drier.
Figure 8b shows a 24-foot trussed rafter using resorcinol-resin glue and nails for joints. Resorcinol resin is a waterproof, low-temperature-setting glue. Caseine-type glues are not desirable because of the probability of high moisture conditions in farm buildings.

The glue is applied to one or both sides of the joint in sufficient quantity so it will start to ooze out on the sides when the nails are driven. The nails create pressure on the glued joint and hold the joint together during fabrication.

Fabrication of Trusses

Both the split-ring and glued trussed rafters can be fabricated on 4 sawhorses as shown in the upper left of Figure 8b. The lower 2 x 6 chord which has been made exactly 24 feet long is placed on the 3 sawhorses. Each upper 2 x 8 chord is marked off 13 feet on the inside and laid as shown. The inside 13-foot mark and the upper corner of the lower 2 x 6 chord are placed together. This gives a 5 on 12 slope. The heel gusset and collar plate are then placed on the side that is up. The web members in the split-ring truss are then applied. Then the peak is lifted over and the sawhorse moved under so the truss has its other side up. Then the other heel gussets and the web members of the glued truss are applied.

Attaching Trusses to Poles

Aligning and attaching the 24 trussed rafters to the poles uses a method similar to that employed for the 2 x 12 rafter, see page 6. Figure 10 shows how the trusses can be lifted into place.

Knee Braces

Knee braces are optional for either trussed rafter. On a building where the lower chord is approximately 12 feet or less from the ground, knee braces usually are not necessary. For higher buildings with no side lean-tos the knee brace is desirable. Side lean-tos reduce the necessity for knee braces. For a building that has closed ends and is not longer than 5 times its width, knee braces are usually not necessary.
156 TIES BETWEEN TRUSSES

TWO 24 FT. TRUSSED RAFTERS REQD.

1 X 6 TIES BETWEEN TRUSSES

PURLINS SPACED 24" C. C. FOR LESS TO MATCH END LAP OF ROOFING.

OPTIONAL PURLIN TIES

FIGURE 9. An assembly of two 24-foot trussed rafters, with purlins and ties, attached to pole. It is spaced lengthwise 14 feet on center.

FIGURE 10. A long pole can be used to lift trusses into place. Shift guy wire to lift next set of trusses.

FIGURE 11a. 2½ split-ring installation. Drilling.

FIGURE 11b. Grooving

c. Placing ring

d. Tightening nut
Purlins are lengthwise frame members that support the roofing, and are in turn supported by the rafters. They are made from 2 x 6 x 14-foot, standard (1200f), Douglas-fir lumber or equivalent, and are connected to the rafters by ties (Figures 12 through 16). Ties perform two functions:

1. They hold the purlin in place on the rafters, prevent sliding, or tipping or uplift during high winds.
2. They form a bridge between the two rafters combining them into a single beam. Only tie 2 will perform this function satisfactorily. Where tie 1-P is used, no bridging is necessary. If other ties are used, the 2 x 12 solid bridging placed in the center of the span as shown in Figure 17 will do the bridging.

Tie 1-P is used to tie the two purlins which are next to a pole. Tie 1-R is relatively the same as tie 1-P, except that it is fastened to the rafters by a splice plate, which can be made of sheet-metal, 1-inch board, or plywood.

Tie 2 is excellent because it performs both tie functions. The limitation is that it must be the same width as between the rafters.

Tie 3 is designed for use with the ring-shank nail (Figure 6). This type of nail, which is difficult to remove, counteracts uplift caused by wind pressure.
FIGURE 15. Tie 3.

FIGURE 16a. Tie 4A.

FIGURE 16b. Tie 4B.

FIGURE 16c. Tie 4C.

FIGURE 17. 2 x 12 solid bridging.
Roofing Application

2½-Inch Corrugated Sheet Metal

Apply either 28-gauge, 2½-inch corrugated-galvanized-steel roofing or .024, 2½-inch corrugated aluminum roofing directly to the purlins as shown in Figure 18. Space purlins not more than 2 feet on center, but they can be placed closer together in some places to allow proper head lap construction.

Slope of a sheet-metal roof should not be less than 3 on 12. If the slope is 4 on 12, or steeper, the end lap should be 6 inches. If the slope is less than 4 on 12, it should be at least 8 inches. Metal roofing should be nailed in every other corrugation. Nail galvanized-steel sheets with 2-inch, screw-shank, galvanized-steel nails with lead washers. Nail aluminum sheets with 2-inch, screw-shank, aluminum nails with neoprene washers.

Caution: Do not use galvanized-steel nails with aluminum roofing, or aluminum nails with galvanized-steel roofing.

3½-Inch, Exterior-type, Douglas-fir Plywood

Three-eighths-inch, exterior-type, Douglas-fir plywood can be used as a roofing material. Apply to the purlins as shown in Figure 19. Any grade of exterior-type, Douglas-fir plywood can be used, but CC unsanded sheathing is the most economical.

Two-by-four backers are placed between the purlins under the side joints of plywood sheets. The sides of plywood sheets are spaced $\frac{3}{4}$ inch apart to allow for expansion. Cover side joints with 3-inch battens. A 4-inch end lap is centered over a purlin.

Nondrying mastic beads are placed in the $\frac{1}{8}$-inch side joint, under the outer side of the battens, under the end joint of the batten, and under the lower end of the 4-inch plywood sheet end lap.

Use 6-penny galvanized nails to nail the plywood sheets and battens to the 2 x 4 backers and purlins. Figure 19 gives the maximum

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![Figure 18. 2½-inch, corrugated sheet metal roofing application.](image)
spacing of the nails. Side joints and battens are nailed together.

Exterior-type Douglas-fir plywood can be applied without any treatment for preservation. The use of paints will prolong the life of exterior-type plywood but it may not be economical. However, a low-cost stain can be used to give it a colored appearance.

Asphalt Roofing on Solid Sheathing

Asphalt shingles and 19-inch selvage, double-coverage, asphalt roll roofing can be applied on solid sheathing. Apply sheathing to the purlins as shown in Figure 22. Either 1-inch tongued and grooved boards or 3/8-inch, exterior type, Douglas-fir CC grade unsanded plywood can be used as sheathing. The purlins must be spaced 2 feet on center to match the sheathing butt joints.

Asphalt shingles should be applied at a minimum slope of 4 on 12, but you can apply 19-inch selvage, roll-roofing slopes as flat as 1 on 12. Roll roofing is the only type of material shown in this bulletin that can be placed on slopes less than 3 on 12.

Other Types of Roofing

Any type of roofing that can be applied on solid sheathing is suitable for this type of construction, including other types of asphalt roofing, wood shingles, 1/4-inch corrugated sheet metal (with a layer of 15-pound asphalt felt underneath), and asbestos-cement shingles. Hardboard in some cases may be applied the way you put on plywood.

Other types of corrugated products may be applied similar to the corrugated sheet metal shown in Figure 18.
FIGURE 20. Applying mastic between plywood sheets. Note that a 1 x 12 with cleats is used as a portable working platform. A 2 x 4 cleat on the under side of the 1 x 12 hooks over the top purlin. This 1 x 12 platform can be used to apply all types of roofing.

FIGURE 21. Placing a wedge on the bottom purlin. The gutter can then be fastened to the wedge with the spike going through both the gutter and wedge. A string is stretched on the purlin to guide in sloping the gutter.

FIGURE 22. Asphalt roofing applied on solid sheathing.
Walls and Cornices

Siding, Girts, and Splatter Boards

Splatter boards are pressure-treated, 2-inch tongued and grooved 2 x 6’s or 2 x 12 planks with or without flashing. It is cheaper to use pressure-treated lumber (which has a higher first cost but longer life) than untreated lumber. Place splatter boards at least 1 1/2 feet above the ground and at least 6 inches below the ground. Add pea-gravel around that portion of the board in the ground. Use one or two small treated posts to support the splatter boards between main building poles.

Figure 23 shows two types of wall girts, the lapped girt and the continuous spliced girt. The continuous spliced girt is used when the girt must have the same height throughout its length. Examples: side cornices and under an end lap for siding material. The top 2 x 4 should be nailed to the lower 2 x 4 with 20-penny nails.

Use 40-penny, ring-shank nails to nail the splatter boards and girts to poles. See Figure 6.

Any siding material which can be applied to horizontal girts can be used.
Figure 26 shows the details of how corners are made.

Figure 25 shows how to make the close rake cornice on the end of the building. Note that only the inside rafter is used.

An extended rake cornice can be made by using 16-foot or shorter purlins on the end section. A continuous end girt, to which the top of the siding is nailed, should be nailed to the poles under the purlins. A 2 x 6 facial board is nailed to the ends of the purlins.

Figure 26 shows how the close rake cornice and the covering for the 24-foot trussed rafter are made for an open end.

Figure 27 shows how three types of side cornices can be made.
Silo Wall

When side support is needed for silage, grain, or hay, use the silo wall shown in Figure 28. Two extra poles are placed between the main building poles to help support the lateral pressures on the wall. These poles should be the same size and length as the main poles. Extra poles are not fastened to the roof and don’t carry any vertical loads. They do not need footings. The feature of this wall is that any 4-foot 8-inch section can be removed or replaced at any time.

Floors

Any type of dirt, gravel, or paved slab can be placed around the poles for a floor. For dirt and gravel floors, level the ground before digging holes. Evacuation for paved floors can be done before the pole holes are dug. Fill, and place paved slab after the poles are plumbed.

Combinations

The 2 x 12 rafters, 24-foot trussed rafters, and poles can be made into many cross-sectional combinations.

Figures 29 through 38 show how 2 x 12 x 16-foot rafters can be attached to 16-, 20-, 25-, and 30-foot poles with a slope of approximately 4 on 12, which permits the use of any type roofing reported in this bulletin. The 16-foot side pole can be placed 4 to 4½ feet in the ground and have 10-foot clearance under the eaves. The 25-foot and 30-foot poles are shown with the optional lateral bracing. Any of the side and end walls can be left open or constructed with any of the walls or cornices.

Poles are spaced 14 feet apart laterally. Inner poles are measured to the center and the outer poles are measured to the outside edge.

These cross-sectional combinations are spaced 14 feet apart lengthwise. Inner poles are measured to the center and the outer poles are measured to the outside edge.

By using the 24-foot trussed rafter, additional cross-sectional combinations can be obtained, as shown in Figures 39 through 46.
Combinations . . . (con't)

Poles on which the trussed rafters are attached are spaced 24 feet apart from outside to outside. The poles in the lean-tos are spaced 14 feet apart from the outside of the truss poles to the outside of each lean-to pole. These combinations are also 14 feet apart lengthwise.
Combinations ... (con't)

FIGURE 37. 56-foot off-center roof. The right 14 feet can be left off to make this a 42-foot off-center roof.

FIGURE 38. 56-foot double-gable roof. This shape can be made in multiples of 28 feet.

FIGURE 39. 24-foot, low-clearance gable roof.

FIGURE 40. 24-foot silo wall. The 24-foot, trussed rafter can be added at a later time. This is expandable to structure shown in Figure 46.

FIGURE 41. 24-foot high-clearance gable roof. The silo walls can be added at a later time.

FIGURE 42. 28-foot lean-to. The slope on this roof is limited.
Installment Building

Many cross-sectional combinations lend themselves to "installment" building—that is, constructing part of the building first, then adding to it at a later date. An installment can end or begin where two sets of rafters are attached to the poles. If only the lower set of rafters is in the first installment, the poles will extend above the roof until the second set of rafters is added.

Any wall, cornices, or part of a wall can be considered an installment, and can be added any time after the poles are placed.
From the detailed parts described many different sizes and shapes of buildings can be constructed with various types of materials. The procedure in completing a building plan follows:

1. Choose the desired cross section.
2. Determine the length of the building.
3. Choose the type of roofing.
4. Determine the roof slope (minimum slopes are given in Figures 18, 19, and 22. If greater than 4 on 12, 2 x 12 x 18-foot rafters will be required).
5. Choose the clear height under the eave.
6. Choose either round poles or square posts.
7. Determine the type and size of the footings and the depth of poles.
8. Draw cross section to scale. This can easily be done on graph paper.
9. Determine the size and length of poles or posts.
10. Determine the perimeter spacing necessary to apply the roofing material, plus length of roofing material.
11. Determine the types of purlin ties.
12. Choose type of side cornices.
13. Choose type of siding material.
14. Choose the type of splinter boards.
15. Determine the number, type, and spacing of wall girds.
17. Choose type of floor material.
18. Draw the plan view showing the location of the poles and indicating to which poles walls will be attached.

The cover pictures and Figures 47 to 51 are pictorial drawings of six complete building plans that were made from these detailed parts. By choosing alternate materials and detail parts these plans may be varied as desired.

The cross-section and plan-view drawing, plus the description and views of the details in this bulletin, should be sufficient for working drawings. From these a bill of materials can be made.

FIGURE 47. 28-foot, open-shed gable roof 56 feet in length, and plywood roof and walls.
FIGURE 48. 24-foot, open-shed trussed roof 56 feet in length, and sheet metal roof and walls.
FIGURE 49. Monitor barn which is used as a horizontal, self-feeding silo with feeding and loafing lean-to's.
FIGURE 50. 42-foot open shed, saw-tooth roof.