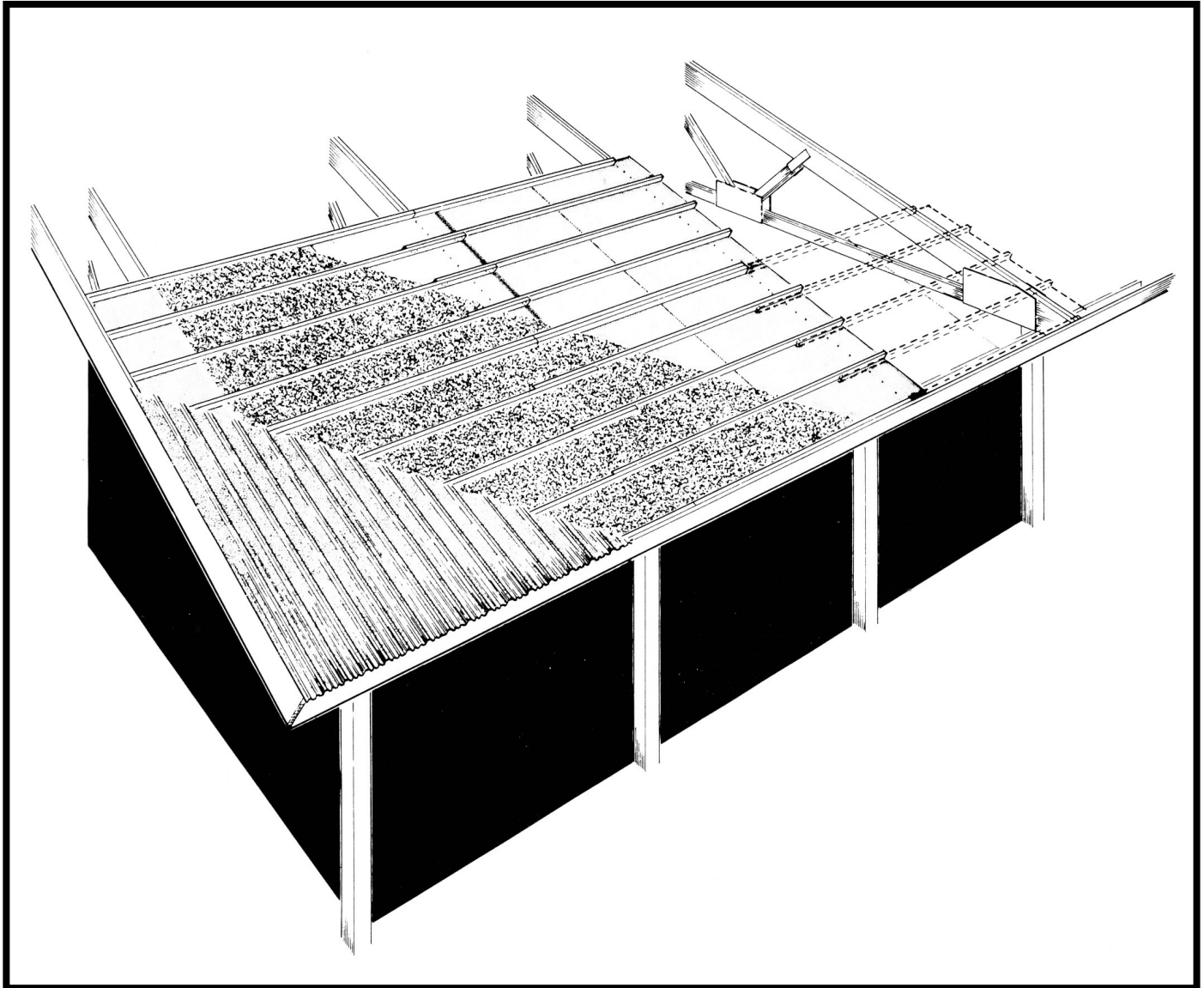




PREFABRICATED INSULATED ROOF PANELS



DEVELOPED BY CANADA PLAN SERVICE

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CPS

PLAN 9302

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This plan provides a method for building a wood-and-metal insulated roofing system that will span up to 8 ft between supporting rafters or roof trusses.

Well-coated livestock such as cattle and sheep show little improved performance when housed in warm barns. Barns maintained 'cold' in winter can be naturally ventilated using adjustable sidewall openings and an open roof ridge slot. For this, the roof needs only enough insulation to conserve some animal heat to 'power' the natural ventilation and control condensation under the roofing. Space for this 2 or 3 in. fiberglass insulation is provided by placing 2 x 4 in. wood roof purlins on edge.

DESIGN REQUIREMENTS The roof purlins should be spaced and interconnected so that they are strong enough to support expected now load, as well as uplift forces due to wind. The local design snow load and the rafter spacing are used to determine the size and spacing of roof purlins. The detailed plan shows 2 x 4 in. x 10 ft roof purlins spaced at 16 or 24 in., and a table in the plan gives total design roof loads for these combinations.

This plan gives instructions for purlin lengths and nailed connections that give maximum structural strength with minimum materials. For example, the purlins are specified 10 ft long to give a doubled lap joint of 2 ft when placed over trusses spaced 8 ft on center. This provides doubled members over the supports, where snow loads will produce the greatest bending stress. Because this special doubled purlin joint is assembled over each supporting rafter, safe snow loads table in the plan are considerably greater than corresponding snow loads given in Leaflet 9301, Roof Purlins.

PREFABRICATING THE PANELS Start by building an accurate jig at a convenient 'workbench' height for easy nailing. Carefully located plywood spacer cleats and end-stops on the jig will make it easier to drop precut frame parts and plywood ceiling panels into their proper places, for accurate nailing.

The ceiling panels are assembled upside-down. Start by laying out the purlin pieces, then apply and staple a square of polyethylene film to provide the vapor barrier. Next lay out the two panels of exterior-grade plywood which later become the ceiling. To avoid rust stains and premature failure, use only hot-dip galvanized nails.

BUILDING THE ROOF Note that two panel types are required, one with the plywood positioned to the 'right'

end of the purlin pieces, and one with the plywood to the 'left'. Each completed panel is lifted from the forms and turned over. In addition, the alternating 'right' panels are rotated 180° so that the protruding purlin ends can overlap with those of the adjacent 'left' panels when positioned on the roof.

If the roof is properly dimensioned, only two types of panel are needed. For this, overall roof dimensions should be a multiple of 8 ft eave-to-ridge, and 2 ft plus a multiple of 8 ft end-to-end. This allows for a gable roof overhang of 1 ft at each gable end.

Galvanized sheet steel strapping (about 1 1/2 in. wide) holds down the roof in case of severe wind uplift. These straps must be bent and nailed tightly around the rafters and purlin ends as installation of the roofing panels proceeds; the straps will be difficult (if not impossible) to install later. Galvanized steel rafter clips may be substituted as shown in the plan.

Also, nail down through the plywood ceiling into the rafters; this keeps the roof from sliding off the trusses. Then nail together the overlapping ends of the roof purlins, to complete the 'doubled beam' effect over each rafter. Note that the top doubled and bottom edge purlins of each panel do not extend beyond the panel corners.

INSULATION The principal advantage of this roof system is that it permits rapid installation of inexpensive 'friction-fit' glass fiber insulation as used in modern housing. Purlins spaced at 16 or 24 in. centers correspond to standard widths of this moisture-and-fire-resistant insulation. Seal the meeting edges of the vapor barrier with self-adhesive 2 in. wide plastic repair tape, then fit the insulation between the purlins from above, just before applying the metal roofing. It is preferable to use a blanket of lesser depth than the 3 1/2 in. depth of the roof purlins to allow some air-space between the insulation and the metal roofing.

If greater than 3 in. of insulation is required (for a 'warm' barn or a severe winter climate, for example), it is practicable to increase the purlins to 2 x 6 in. or more; in this case some solid 2 x 4 in. blocking must be fitted between the purlins over each rafter to prevent the purlins from 'rolling'. In any case, make sure some air space remains between the top of the insulation and the underside of the metal roofing.

In case some moisture finds its way into the roof space, this air-space should be vented by way of the roofing ribs as well as horizontally through screened slots under both eaves at the building ends. Wire screening is essential in the eave-slots to keep birds and rodents out of the roof insulation.

METAL ROOFING Finish the roof with galvanized steel or aluminum roofing. Follow recommendations for the roofing manufacturer, and be sure to use metal thickness and roofing profiles that are consistent with the purlin spacing and design snow load.