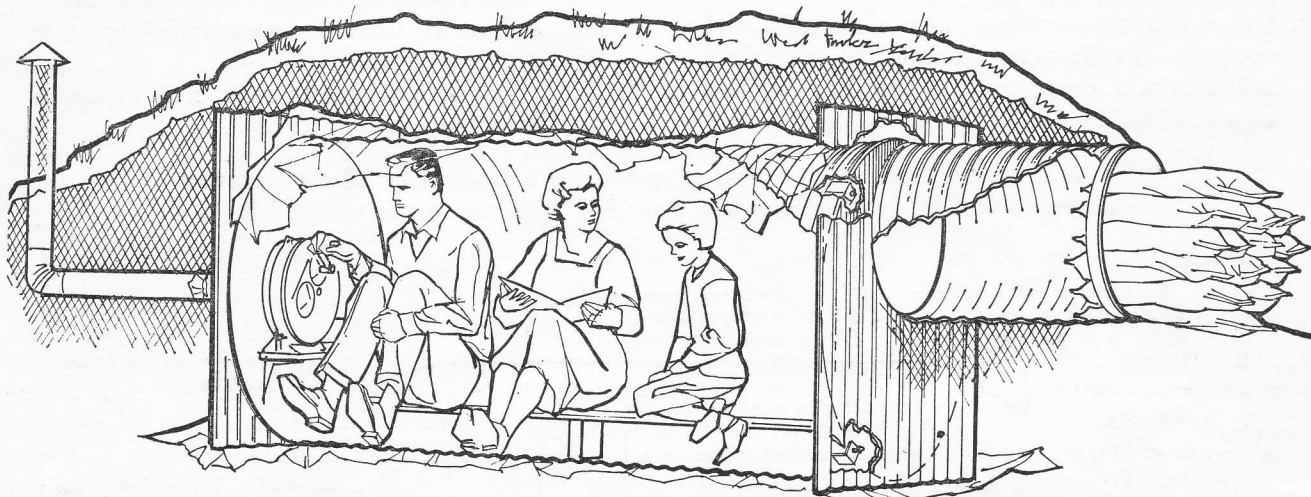




# Belowground Corrugated Steel Culvert Shelter



## GENERAL INFORMATION

This shelter is designed to provide low-cost protection from the effects of radioactive fallout. Its principal advantages are that most of the structure is generally available as a prefabricated unit ready for lowering into an excavation and that it requires only simple connections and covering to complete the installation.

## TECHNICAL SUMMARY

**Space and Occupancy.**—This shelter has 32 square feet of area and about 120 cubic feet of space (including the entranceway). It could provide space for three persons. The addition of a 4-foot length would provide for one more person.

**Availability and Cost of Materials.**—This type of shelter is available from steel culvert fabricators or their sales outlets in most population centers. This prefabricated shelter, including ventilation system, plastic wrap, and sandbags is designed to be sold for \$150 or less, excluding delivery and installation.

**Fallout Protection Factor.**—When the entranceway is properly shielded as shown in the drawings, the protection factor should be greater than 500.

**Blast Protection.**—This shelter could be expected to withstand a limited blast overpressure of 5 pounds per square inch.

**Ventilation.**—A sheet metal intake vent 3 inches in diameter is provided together with a manual airblower for more than three persons. Air is vented through the sandbag closure at the entrance.

**Installation Time.**—One man working with hand excavation tools should be able to complete the excavation in less than 2 man-days. Two men will be needed to roll the shelter structure into the excavation from the point at which the shelter has been delivered. If lifting rather than rolling is necessary to transport the structure, four men will be required. Time for this phase will vary upward from 1 hour depending on distance of the move. It will then take one man 4 working days to complete the covering and installation phases.

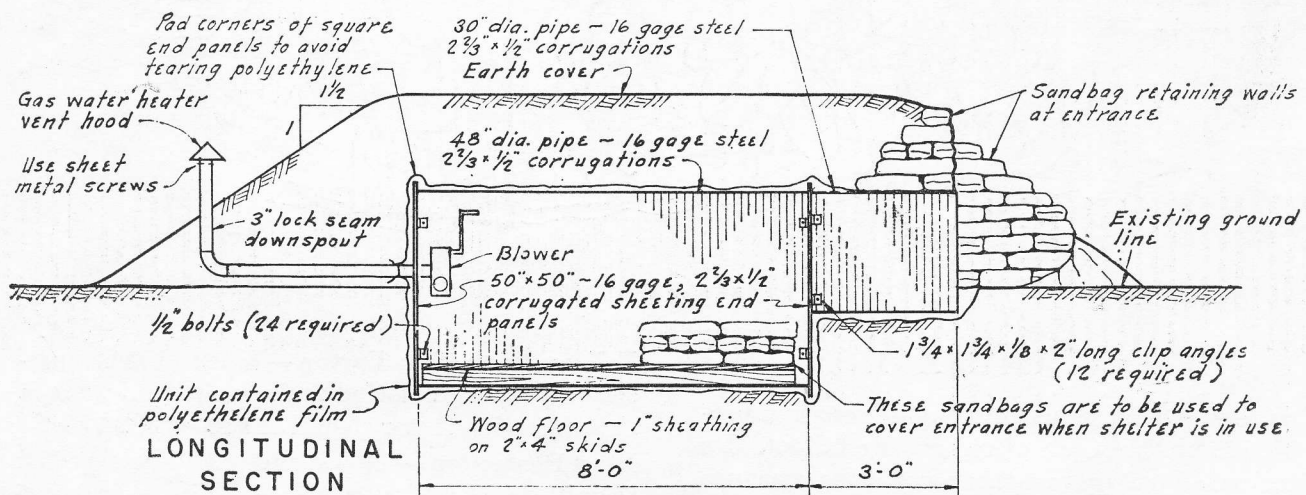
**Structural Life Expectancy.**—The estimated life of this galvanized steel shelter will be at least 10 years under most soil conditions. Under normal conditions highway culverts of similar material have been known to last indefinitely with little maintenance.

### CONSTRUCTION SEQUENCE\*

1. Select well-drained site. The total area required, including the mounding, will be approximately 15' x 20'.
2. Use stakes to mark the corners of the area, and excavate. The hole required for the main shell is 5' x 9' x 2' deep, and the entrance requires an additional 2½' x 4' x 6''.

3. Line hole with plastic film wrap.
4. Lower galvanized steel shelter into place on supporting wood strips.
5. Assemble and install the vent pipe.
6. Cover shelter with plastic wrap.
7. Backfill and mound. Be sure the shelter is covered by at least 2 feet of packed earth. Depth may be checked with a wire probe. The mound should be covered with grass as soon as possible by sodding or seeding to prevent the protective soil from being eroded.
8. Place small sandbags inside the shelter. These are used to fill the entrance completely after the shelter is occupied.
9. 1-inch boards may be used on 2" x 4" blocks to provide a floor.

\*This is a generalized construction sequence for a prefabricated steel culvert shelter. Detailed instructions are provided with the construction kit.



### BILL OF MATERIALS (To shelter 3 persons)

Item	Quantity
Prefabricated steel culvert shelter (with bolts and clips supplied, if unit is not spot welded).*	1.
Galvanized steel lock-seam downspout.....	6 feet.
Elbow for steel lock-seam downspout.....	1 foot.
Ventcap (gas water-heater type).....	1.
Intake air blower (optional for 3 persons or less).....	1.
Scrap lumber.....	9 board feet.
6 mil. polyethylene film (20' width).....	30 feet.
Sandbags (to hold 75 to 100 pounds each).....	18.
Sandbags (to hold 15 to 20 pounds each).....	30.
Flyscreen 7" x 7", for ventpipe.....	1.
Entranceway insect screen 36" x 36".....	1.
Soil or sand (for shelter cover).....	5 tons.

\*Fabricators should treat spot-welded areas with bitumastic compound or other approved waterproofing material.