HOME OFFICE

AIR RAID PRECAUTIONS

DIRECTIONS
FOR THE ERECTION AND SINKING
OF THE GALVANISED CORRUGATED
STEEL SHELTER

February 1939

Crown Copyright Reserved
DIRECTIONS FOR THE ERECTION AND SINKING OF
THE GALVANISED CORRUGATED STEEL SHELTER.

Description of the Shelters
The shelters described here consist of a steel form (about 6 ft. 6 in.
long x 4 ft. 6 in. wide x 6 ft. high, internal dimensions), over
which it is intended to pile earth. This size shelter is the unit and
variations on it will be dealt with in a separate leaflet.
The following are the parts provided for each standard unit
shelter:

Two steel channels, each 6 ft. 6 in. long.
Two steel tee sections, each 5 ft. 3 in. long.
Two steel angle sections, each 5 ft. long.
Four steel rivets, 3/4 in. diameter, 4 in. long.
Six curved corrugated steel sheets, 6 ft. high and 2 ft. 4 in. wide.
Two flat corrugated steel sheets 6 ft. long, and 2 ft. 4 in. wide.
Two flat corrugated steel sheets 7 ft. long and 2 ft. 4 in. wide,
each having one corner cut off (one left- and one right-hand
sheet).
Two flat corrugated steel sheets 3 ft. long and 2 ft. 4 in. wide.
One flat corrugated steel sheet, 3 ft. 3 1/2 in. long and 2 ft. 4 in.
wide.
One flat corrugated steel sheet 1 ft. 3 in. long and 2 ft. 4 in. wide.
Twenty-six bolts and nuts 3 1/2 in. long and 3/4 in. diameter.
Fifty-two curved diamond washers.
Two flat steel clips 9 1/2 in. long and 3 in. wide with a hook at
one end.
One spanner-tommy bar combined.
The parts will be found illustrated in Figure 3.
The construction of a shelter involves the following operations:
A. Choosing the proper location for it.
B. Excavating a hole of the proper size to receive it.
C. Erection of the metal portion of the shelter.
D. Covering the whole with earth.

(A) Location of the Shelter
The shelter, for convenience, should be placed near the house,
although, of course, not against it. The nearest portion of the hole
should not be closer than 6 ft. to the house, and preferably rather
farther away, but, if the distance exceeds 15 ft. it is advisable to
erect an earthen or other wall to provide splinter-proof protection
for the shelter entrance. In order that the services may not be
disturbed, the Local Authority must plainly mark the site on which
the shelter is to be erected. If the Local Authority does not also
erect and sink the shelter, it should advise the householder as to
storing the material to the best advantage. If the sheets are stored
in the open they should be arranged to throw off rainwater and
particularly to prevent water collecting between them.
Shelters may be sited singly or, if the householders agree, may be
grouped in various ways. Grouping offers obvious advantages, e.g.
there will be a greater amount of earth available for covering
for the same amount of digging; and if two shelters are faced towards
one another they will offer mutual protection for their entrances.
Figures 1 and 2 show some arrangements.

(B) The Excavation
An excavation is required to receive the shelter. It has been
shown by tests that if a hole 7 ft. 6 in. long by 6 ft. wide be dug
to a depth of 4 ft., sufficient space will be allowed for erecting
the steelwork, and sufficient earth will be excavated to provide satis-
factory protection. Where the water-level in the garden prevents
excavation to this depth, it will be necessary to call upon other soil
for the protection, but, as the efficiency of the protection depends
upon the depth to which the shelter is sunk in and covered by the
earth the minimum depth should be 2 ft.
Stages 1 and 2 of Figure 4 illustrate this point.
Stage 3 shows the corner treatment of the excavation, the recesses
being necessary to receive the edges of the steel work of the front
and rear of the shelter.

(C) Erection of the Shelter
Some guide to the method of assembly is provided in Figure 3.
The first step in the erection of the metal portion of the shelter
is the placing of the ground framework in the bottom of the exca-
vation. The framework consists of two tee sections and two channel
sections. The tee sections are the ends, and the channels the sides.
The following order should be useful in placing them:
1. The tees, leg upwards, should be located near the ends of
the excavation.
2. The channels, also legs upward, should then be located so
that the rivet holes in the tees and channels coincide at the
corners.
3. The rivets should then be pushed into place, the framework
squared, and the rivets driven home.

This is shown as stage 4 in Figure 4.
If the paint of the steel framework be chipped, it may be desirable
to give these pieces a further coat of a preservative paint or tar
before they are put in place.
The erection of the steel arches to form the sides and roof comes next. These consist of the six curved, corrugated steel sheets having slots at the top through which they are to be bolted together. The curved sheets are interchangeable, but their erection is a two-man job.

With one man standing inside the excavation, and the other outside, erection proceeds as follows:

(1) Two of the six curved sheets are located at one end of the excavation, in the channels. The tops of the sheets overlap to form an arch, and using the tommy-bar end of the spanner as a lever, the slots can be brought into line to receive the bolts. These are inserted from the underside, the two inner pairs of slots being left empty to receive the central arch later. Curved washers are supplied one for the inside and one for the outside. These should be carefully "nested" and a dab of paint applied to the threads of the bolts and to the punched edges of the holes in the sheets before bolting up.

This is shown as stage 5 in Figure 4.

(2) The arch at the opposite end is erected in the same way, and is shown in stage 6 in the Figure.

(3) The central arch is placed much in the same way as the two end arches, the outer corrugations of the central arch overlapping the inner corrugations of the end arches. The whole is then bolted and tightened.

Stage 7 in Figure 4 shows the order in which the bolting can be conveniently carried out.

The next step in the erection of the shelter is the fitting of the back end. This is shown as stages 8 and 9 in the Figure. First, one of the angle sections is bolted to one of the 3-ft. sheets, the bolt also serving to affix the two clips in the inside. Then the two 6-ft. corrugated sheets are placed one on each side of the central sheet (overlapping one corrugation) just previously fixed, and the end is completed by the sheet 3 ft. 3 in. long which is pushed up from the inside until it just projects above the arch and rests upon the clips. When the clips are turned upward the sheet will be firmly held in place.

This last sheet forms an emergency exit. It can be removed at any time by turning the clips downward, and pulling the sheet in, and should the main entrance to the shelter be blocked by debris, the householder can dig his way out through this secondary opening.

N.B.—AFTER ERECTION, THE SPANNER SHOULD BE KEPT IN THE SHELTER (PREFERABLY TIED TO ONE OF THE CLIPS), AS IT MAY BE NEEDED FOR LOOSENING THE CLIP-BOLTS BEFORE THE EMERGENCY EXIT CAN BE RELEASED.
Fig. 1.—Some Arrangements of Shelters for Gardens Methods of Drainage. There are Other Methods.
Fig. 2—Some Arrangements of Shelters for Semi-of Drainage. There are other methods of

Detached Houses Showing Some Common Methods Drainage too Numerous to be Shown Here.
Fig. 4—Stage 4. The Frame Arranged in the Bottom of the Hole.

Fig. 4—Stage 5. Erecting the Back Arch.
A. Supports curved sheets. B. Levers slots into line with bar.

Fig. 4—Stage 6. Erecting the Front Arch.
A. Pushes bolts through from underneath.
B. Puts on nuts and tightens up.

Fig. 4—Stage 7. View of Top of Shelter with All Three Arches in Position Showing the Order in Which They Are Bolted Together. Bolts Numbered 13, 14, 19 and so go through Four Sheets.