

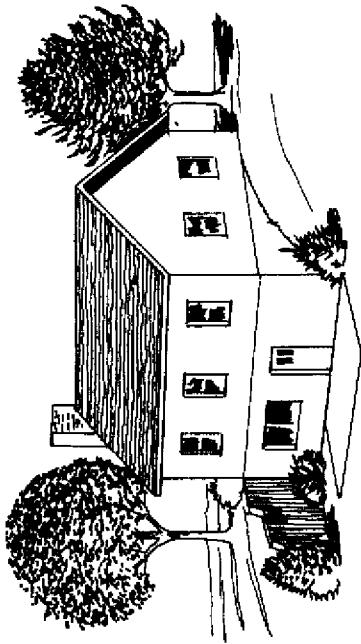
ILLUSTRATIONS OF SHELTER UPGRADING TECHNIQUES

The following illustrations are examples of concepts and approaches for crisis actions to improve the fallout protection of various types of existing buildings. Note that the illustrations indicate that some buildings may need strengthening, to assure that they can support the added burden of earth placed overhead in addition to possible low overpressures from nearby risk areas.

A qualified engineer or builder should advise local officials on which buildings would need such strengthening, before attempting to upgrade their fallout protection.

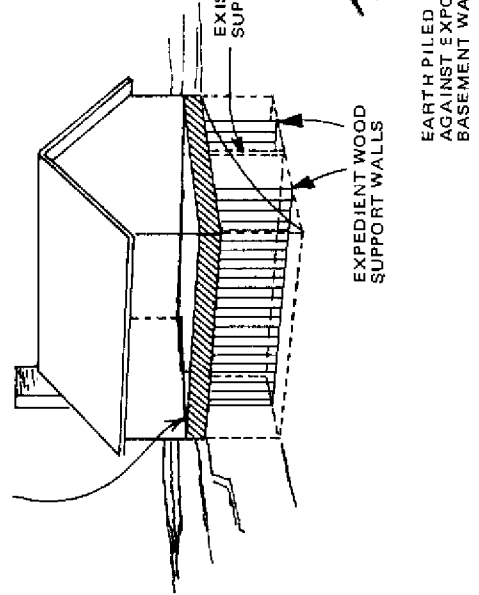
Also, a qualified Fallout Shelter Analyst, if available, should advise on which buildings offer the best potential for upgrading fallout protection.

fallout protection for homes with basements (partially belowground)



STEP ONE -- EXPEDIENTLY CONSTRUCT A WOOD SUPPORT WALL AT THE MID-SPAN TO SUPPORT EARTH ON FLOOR.

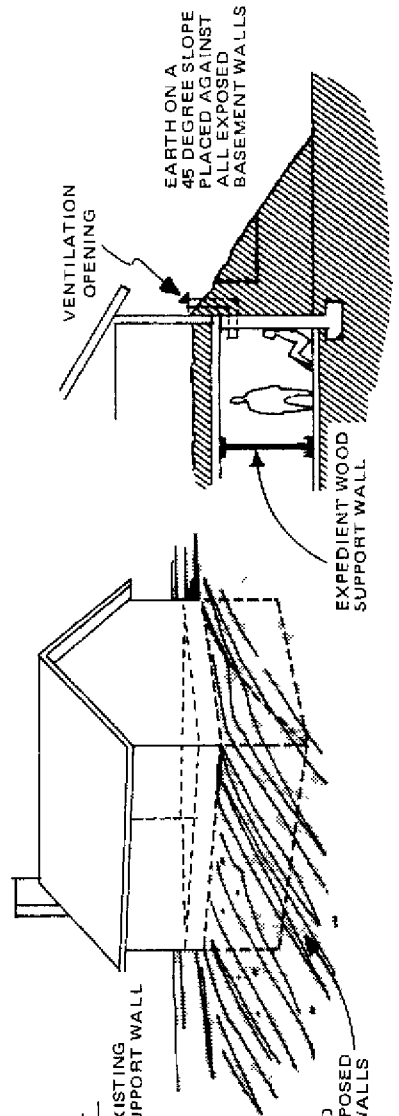
STEP TWO -- PROVIDE OVERHEAD BARRIER BY PLACING 12" OF EARTH ON ROOF OR ON FLOOR OVER BASEMENT



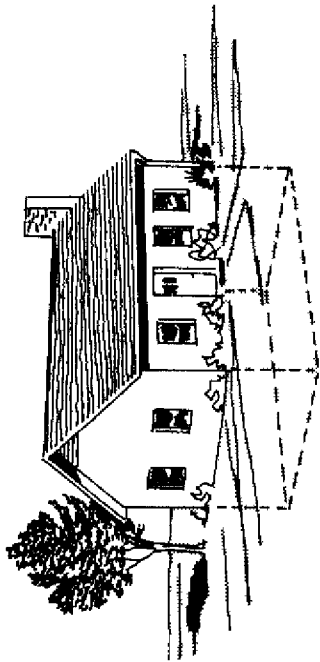
HOMES WITH BASEMENTS PARTIALLY BELOWGROUND ALSO HAVE POTENTIAL FOR PROVIDING FALLOUT PROTECTION BUT NOT AS MUCH AS THOSE WITH BASEMENTS COMPLETELY BELOWGROUND

TO IMPROVE THE FALLOUT PROTECTION IN THE BASEMENT AREA, TWO THINGS MUST BE DONE; (1) PROVIDE AN OVERHEAD BARRIER AND (2) INCREASE THE BARRIER (THICKNESS) OF THE EXPOSED BASEMENT WALLS. THIS CAN BE ACCOMPLISHED AS SHOWN IN SKETCHES. BOTH STEPS MUST BE TAKEN TO OBTAIN THE FALLOUT PROTECTION. DOING ONLY ONE STEP IS NOT ENOUGH.

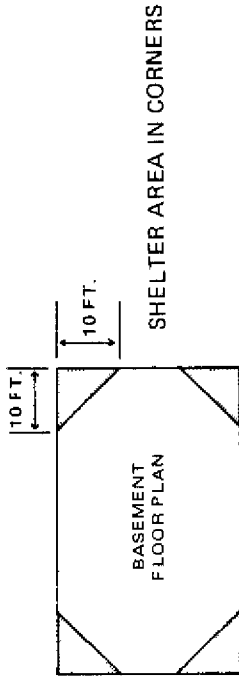
STEP THREE -- IMPROVE VERTICAL BARRIER BY PLACING EARTH AGAINST ALL EXPOSED BASEMENT WALLS. COVER WINDOWS IN BASEMENT WALLS WITH WOOD TO PREVENT GLASS BREAKAGE DUE TO EARTH PRESSURE



fallout protection for homes with basements (fully belowground)

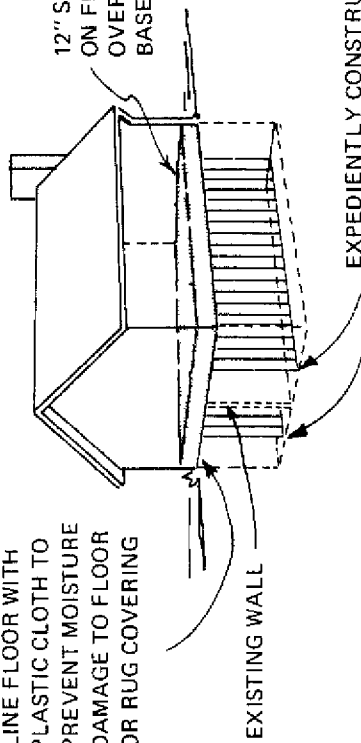


HOMES WITH BASEMENTS (COMPLETELY BELOWGROUND) ALREADY HAVE FALLOUT PROTECTION ESPECIALLY IN THE CORNERS OF THE BASEMENT.

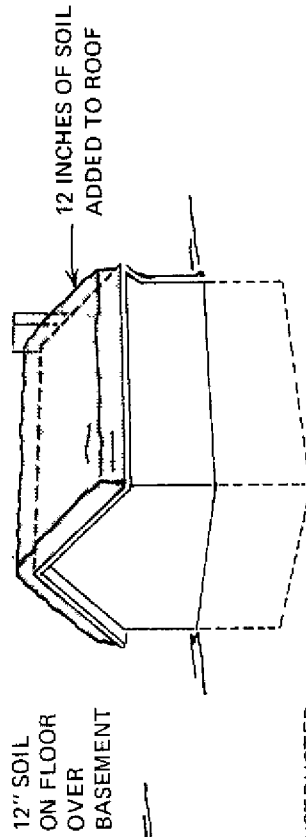


THIS PROTECTION CAN BE ENHANCED CONSIDERABLY BY FIRST EXPEDITENTLY CONSTRUCTING WOOD SUPPORT WALLS AT THE MID-SPAN AND THEN PLACING 12 INCHES OF EARTH OVER THE ENTIRE FLOOR COVERING THE BASEMENT AREA. PLACING EARTH ON THE ROOF OF THE HOME WILL ALSO INCREASE THE FALLOUT PROTECTION.

LINE FLOOR WITH PLASTIC CLOTH TO PREVENT MOISTURE DAMAGE TO FLOOR OR RUG COVERING



UPGRADING THE BASEMENT SHELTER PERMITS THE ENTIRE BASEMENT AREA TO BE FALLOUT PROTECTED, THUS ALLOWING THE HOMEOWNER TO SHARE THE BASEMENT WITH OTHERS.

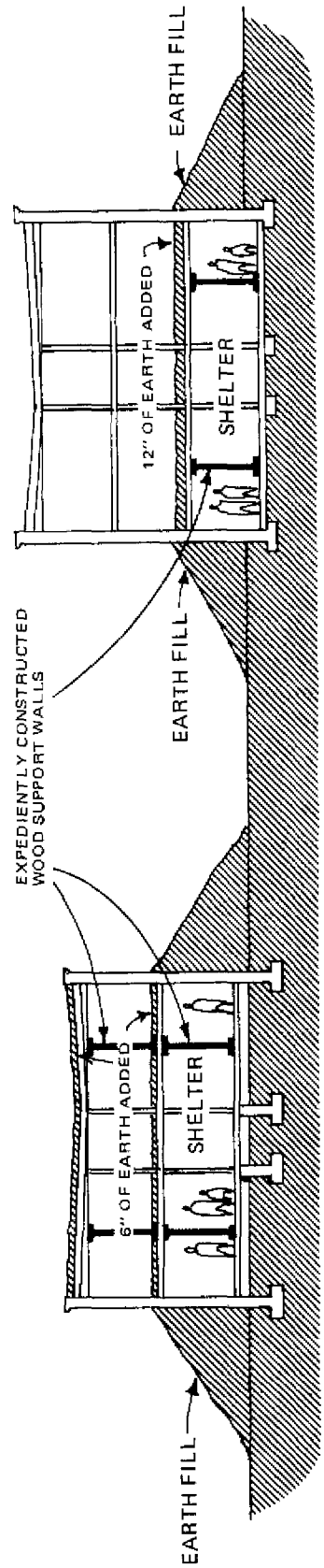


REMEMBER: THE MORE MATERIAL YOU ADD THE GREATER THE PROTECTION. A WORD OF CAUTION. PLACING MORE THAN 12 INCHES OF EARTH ON THE ROOF WITHOUT PROVIDING ADDITIONAL SHORING MAY CAUSE JOISTS TO SAG EXCESSIVELY AND FAIL

fallout protection in school buildings

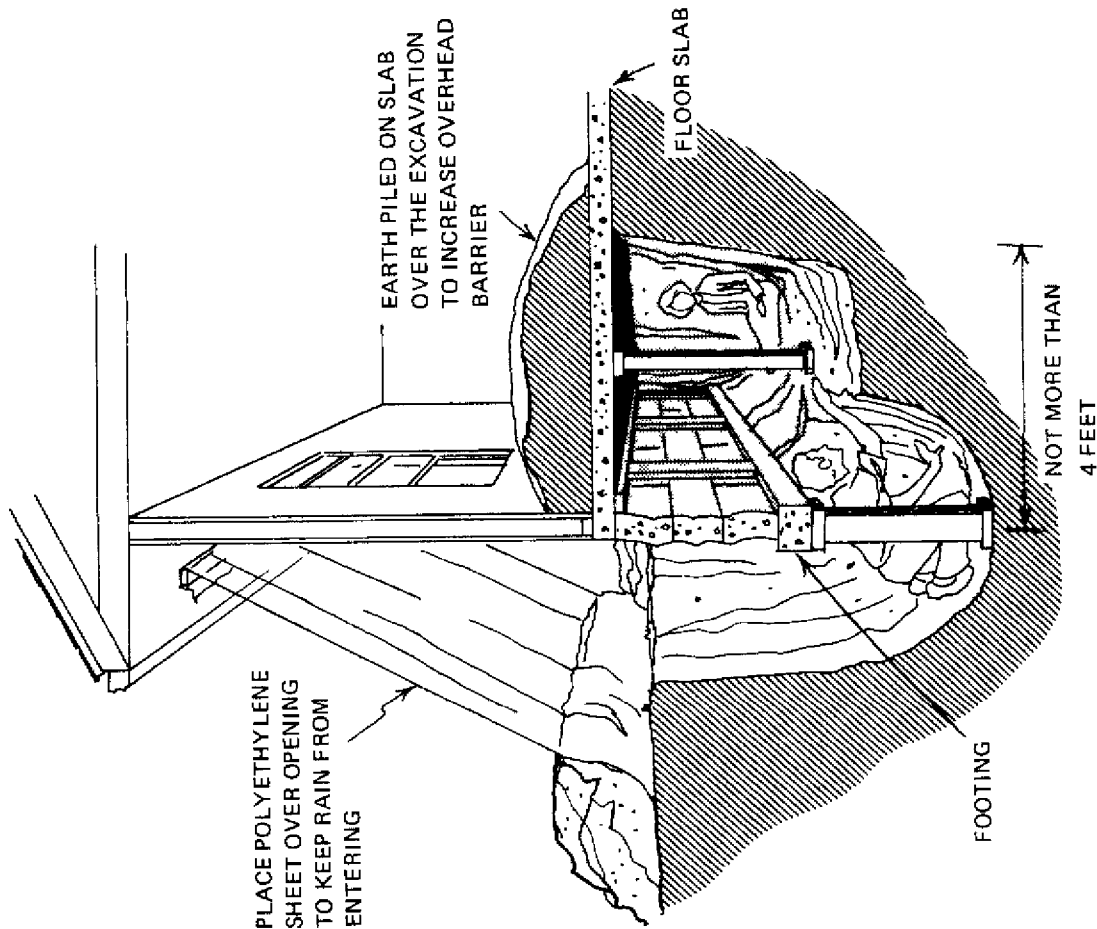


EXISTING SCHOOL BUILDINGS CAN SERVE AS CONGREGATE CARE FACILITIES FOR RISK AREA EVACUEES. BEST FALLOUT PROTECTION CAN BE FOUND IN INTERIOR CORRIDORS AND ROOMS ON THE LOWEST FLOOR, ESPECIALLY IF THE SCHOOL HAS TWO OR MORE STORIES AND THE EXTERIOR WALLS ARE OF CONCRETE OR MASONRY CONSTRUCTION. FALLOUT PROTECTION CAN BE IMPROVED BY FIRST EXPEDITIOUSLY CONSTRUCTING A WOOD SUPPORT WALL AT THE MID-SPAN POINT AND THEN PROVIDING ADDITIONAL VERTICAL AND HORIZONTAL BARRIERS OF EARTH AS SHOWN IN SKETCHES. WINDOWS IN EXTERIOR WALLS THAT ARE TO BE COVERED WITH EARTH SHOULD BE PROTECTED WITH LUMBER OR PLYWOOD SHEETS SO THAT THEY WILL NOT BREAK UNDER THE EARTHFILL.



NOTE
ADDITIONAL VENTILATION WILL BE REQUIRED SEE DESIGN OF AIR VENTILATION PUMP

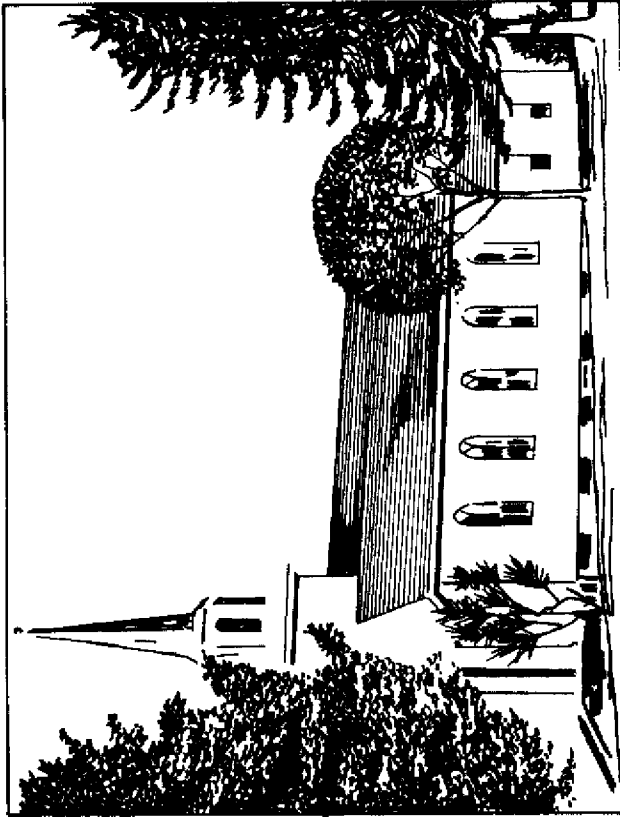
fallout protection for homes without basements



IN ORDER TO PROVIDE EXPEDIENT FALLOUT PROTECTION TO HOMES WITHOUT BASEMENT, ONE APPROACH IS TO EXCAVATE BENEATH THE FLOOR SLAB AS DEPICTED IN THE SKETCH BEING UNDER AN EAVE WILL, IN MANY CASES, KEEP RAINWATER OUT OF THE TRENCH AND THE SHELTER ENTRY TUNNEL. ONCE THE BOTTOM OF THE FOUNDATION WALL IS REACHED, A TUNNEL IS DUG UNDER THE FOOTING AND THE MATERIAL REMOVED FROM UNDERNEATH THE SLAB TO CREATE THE SHELTER. THE SHELTER IS OFFSET FROM THE TRENCH SO THAT THE SHELTER WALL IS NOT EXPOSED ON THE OUTSIDE. THE "HOLLOWED-OUT" SHELTER AREA CAN VARY IN SIZE, BUT IT SHOULD NOT EXTEND MORE THAN 4 FEET FROM THE FOUNDATION WALL.

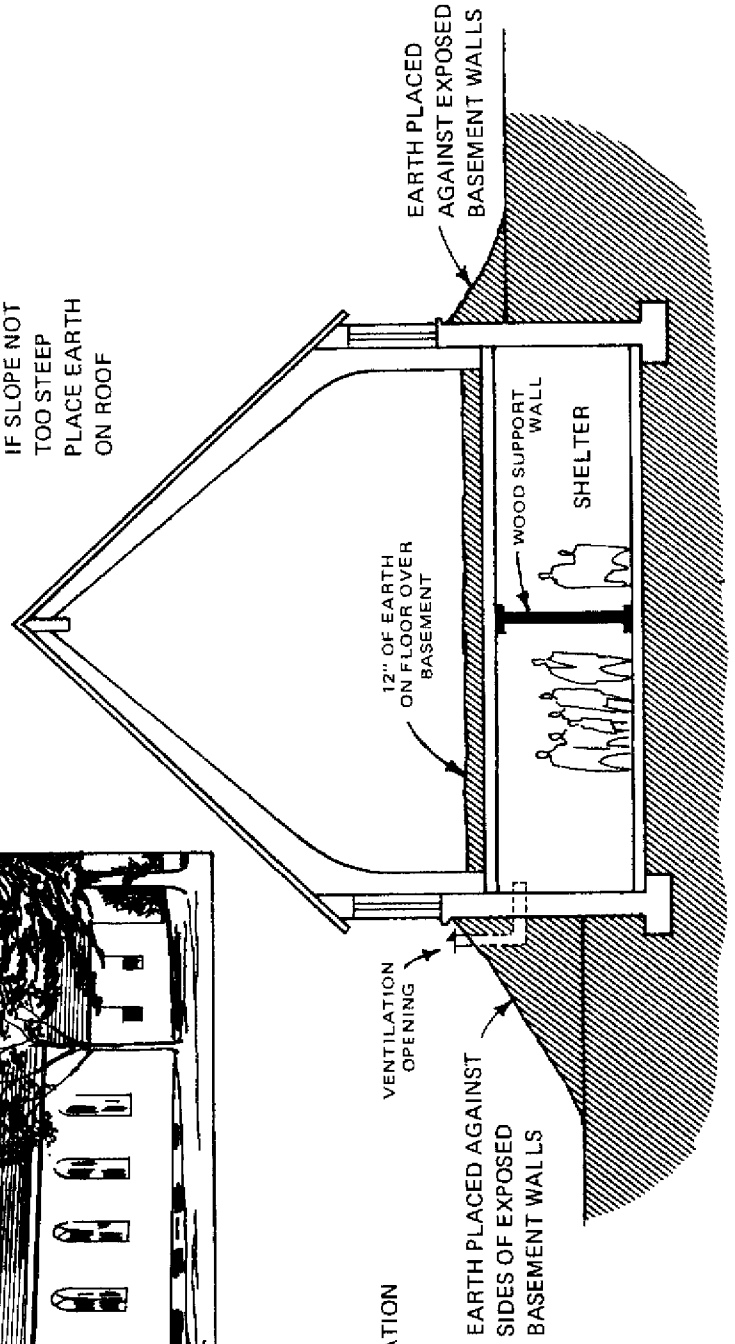
IT IS EXPECTED THAT A TYPICAL SIZE FOR A 4-PERSON SHELTER MIGHT BE 4 FT. DEEP, 4 FT. HIGH, AND 6 TO 8 FT. LONG. SOME OF THE DIRT FROM THE TRENCH CAN BE PILED ON THE SLAB OVER THE SHELTER AND ALSO AGAINST ANY EXPOSURE AT THE TOP OF THE FOUNDATION WALL. ALTHOUGH THE EAVE WILL HELP TO KEEP RAIN OUT OF THE TRENCH, IT WOULD PROBABLY BE WELL TO STRETCH A SHEET OF POLYETHYLENE FROM THE ROOF TO THE OUTER EDGE OF THE DIRT PILE. THIS WOULD HELP TO ASSURE RAINWATER NOT ENTERING THE SHELTER TUNNEL.

fallout protection in churches



EXISTING CHURCH BUILDINGS CAN SERVE AS CONGREGATE CARE FACILITIES FOR RISK AREA EVACUEES. BEST PROTECTION CAN BE FOUND IN THOSE BUILDINGS THAT HAVE MASONRY EXTERIOR WALLS AND BASEMENTS. SHELTER IN THE BASEMENT AREAS CAN BE IMPROVED BY FIRST EXPEDITIOUSLY CONSTRUCTING A WOOD SUPPORT WALL AT THE MID-SPAN POINT AND THEN PLACING 12 INCHES OF EARTH ON THE FLOOR OVER THE BASEMENT AND BY MOUNDING EARTH AGAINST THE EXPOSED BASEMENT WALLS. EARTH CAN ALSO BE ADDED TO THE ROOF PROVIDED THE SLOPE IS NOT TOO STEEP.

IF SLOPE NOT TOO STEEP
PLACE EARTH ON ROOF



NOTE
ADDITIONAL VENTILATION
WILL BE REQUIRED.
SEE DESIGN OF AIR VENTILATION
PUMP

VENTILATION
OPENING

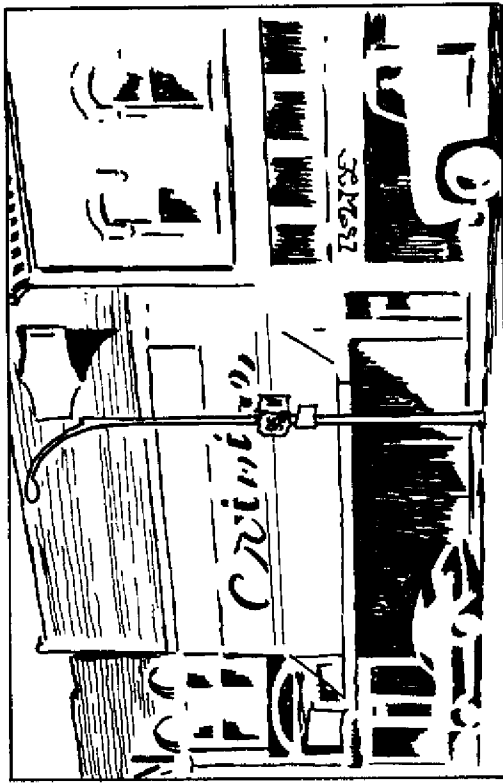
EARTH PLACED AGAINST
SIDES OF EXPOSED
BASEMENT WALLS

12" OF EARTH
ON FLOOR OVER
BASEMENT

WOOD SUPPORT
WALL
SHELTER

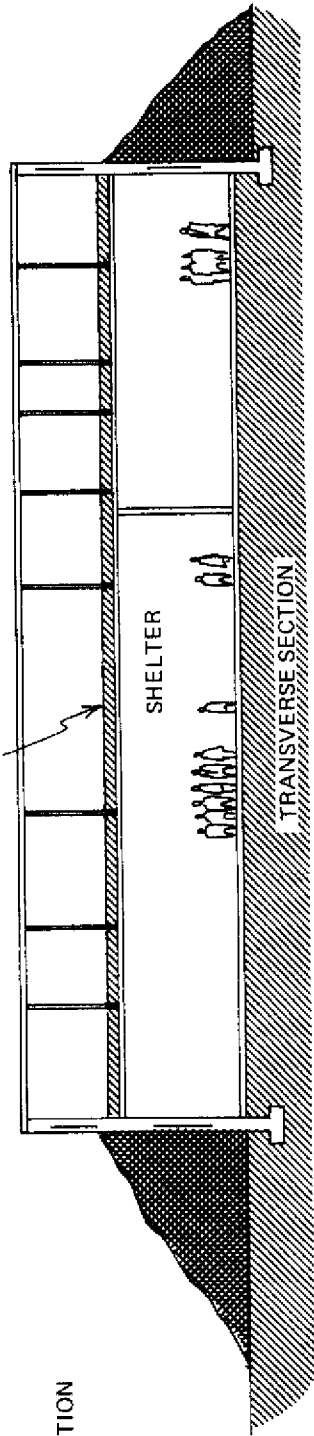
EARTH PLACED
AGAINST EXPOSED
BASEMENT WALLS

fallout protection in typical downtown row-type buildings

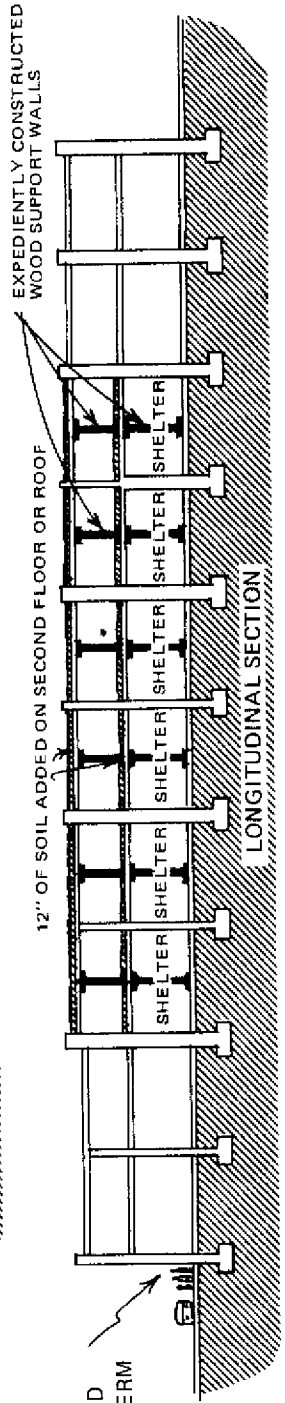


TWO-STORY BUILDINGS IN A ROW GROUPING (NO SEPARATION BETWEEN BUILDINGS) CAN HAVE THE EXISTING FALL-OUT PROTECTION IMPROVED CONSIDERABLY IN THE "INTERIOR" SECTIONS BY FIRST EXPEDITENTLY CONSTRUCTING A WOOD SUPPORT WALL AT THE MID-SPAN POINT AND THEN PLACING EARTH AT THE FRONT AND REAR OF THE BUILDINGS AS WELL AS ON THE FLOOR OVER THE FIRST STORY AND/OR THE ROOF AS SHOWN IN THE SKETCHES. THE TWO BUILDINGS AT EITHER END OF THE ROW SHOULD NOT BE USED FOR SHELTER PURPOSES SINCE THEY PROVIDE SHIELDING FOR THE "INTERIOR" SECTIONS. GLASS FRONTS SHOULD BE PROTECTED FROM BREAKAGE WITH WOOD OR PLYWOOD PANELS.

12" OF SOIL ADDED ON SECOND FLOOR OR ROOF



NOTE:
ADDITIONAL VENTILATION
WILL BE REQUIRED
SEE DESIGN OF AIR
VENTILATION PUMP



END STORES
CAN BE UPGRADED
BY PROVIDING BERM
ON END WALLS

mines, caves and tunnels...



... ARE ANOTHER RESOURCE FOR PROVIDING FALLOUT SHELTER WHILE MOST OF THIS RESOURCE IS NOT LOCATED WITHIN OR NEXT TO MAJOR METROPOLITAN AREAS, IT IS CLOSE ENOUGH TO BE REACHED BY CITY DWELLERS. MINES, CAVES AND TUNNELS EXIST AND ARE IN COMMERCIAL USE IN SUCH PLACES AS KANSAS, MISSOURI, PENNSYLVANIA, VIRGINIA, UTAH, AND MONTANA. THE MAJOR PROBLEM IN GETTING THESE FACILITIES READY FOR PEOPLE TO USE THEM AS SHELTERS IS LIGHTING AND VENTILATION TESTS CONDUCTED IN A LIMESTONE MINE NEAR DOWNTOWN KANSAS CITY INDICATED THAT EMERGENCY GENERATORS WOULD BE REQUIRED TO PROVIDE POWER FOR LIGHTING AND OPERATING THE VENTILATION EQUIPMENT IN THE MINE. A LOCAL CONTRACTOR WAS ABLE TO INSTALL LIGHT AND POWER OUTLETS AT DESIGNATED LOCATIONS IN THE MINE, IN ACCORDANCE WITH A PRE-DESIGNED LAYOUT IN A SHORT PERIOD OF TIME.

LARGE FANS (5 FT. DIAMETER, 60,000 CFM) ARE NEEDED AT THE ENTRANCES TO IMPROVE VENTILATION. THOSE MINES WITH DOUBLE ENTRANCES (TWO ALONGSIDE EACH OTHER AS OPPOSED TO THOSE WITH ENTRANCES AT OPPOSITE ENDS OF THE MINE) REQUIRE CONSTRUCTION OF SPECIAL DUCTING TO PREVENT AIR FLOW "SHORT CIRCUITING" BETWEEN ENTRY WAYS. A DIVIDING WALL FORMED BY COVERING WOODEN FRAMES WITH POLYETHYLENE SHEETS, IS NEEDED TO SEPARATE THE TWO ADJOINING ENTRANCES. WITH THIS DUCTING ARRANGEMENT, THE EXHAUST FANS EXPEL AIR ON ONE SIDE OF THE DIVIDER WALL WHILE FRESH AIR IS DRAWN INTO THE MINE THROUGH THE ENTRANCE ON THE OTHER SIDE OF THE WALL.

SMALL MINES, IF HABITABLE, OR IF THEY CAN BE MADE HABITABLE IN A CRISIS, SHOULD BE INCLUDED IN CRP PLANNING IF THERE IS AN INSUFFICIENT NUMBER OF UPGRADABLE BUILDINGS TO OVERCOME THE SHELTER DEFICIT.

ANY MINES CONTAINING DANGEROUS GASES, HARMFUL BACTERIA, OR EXTENSIVE WETNESS, SHOULD NOT BE USED. ALTHOUGH CAVES AND TUNNELS CONSTITUTE ONLY A SMALL PERCENTAGE OF THE AVAILABLE UNDERGROUND SPACE, THEY TOO SHOULD BE INCLUDED IN THE PLANNING WHERE AVAILABLE AND THE SPACE IS NEEDED.

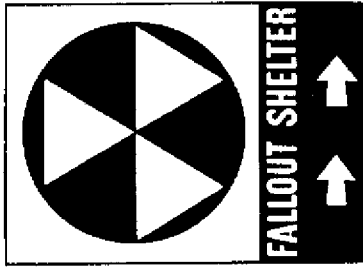
ILLUSTRATIONS OF EXPEDIENT SHELTER DESIGNS

The following designs have all been field tested. In these tests, over 40 typical American families were given only simple instructions (such as the illustrations which follow).

The tests showed that *a typical family can construct these shelters in the daylight hours of a single day.*

Note that expedient shelters provide *excellent fallout protection* (PF's of 100 to 200 or better, if constructed as shown in the following designs), and *significant blast protection as well.* Thus, expedient shelters could provide good protection for key workers or others who were in risk areas at the time of an attack.

These are PLANS FOR EXPEDIENT FALLOUT SHELTERS



SAVE THESE PLANS—THEY MAY SAVE YOUR LIFE

• GENERAL INFORMATION

WITHOUT PROTECTION, UNTOLD NUMBERS OF AMERICANS WOULD DIE NEEDLESSLY IN THE EVENT OF A NUCLEAR ATTACK. THE EXPEDIENT SHELTERS ILLUSTRATED IN THE FOLLOWING PAGES PROVIDE PROTECTION TO OCCUPANTS FROM THE DEADLY RADIATION OF RADIOACTIVE FALLOUT GENERATED BY A NUCLEAR DETONATION — THEIR USE CAN SAVE THE LIVES OF MILLIONS OF AMERICANS.

EVEN THOUGH THE ILLUSTRATED SHELTERS ARE VERY AUSTERE, THERE ARE A NUMBER OF THINGS THAT CAN BE DONE TO IMPROVE THEIR HABITABILITY AFTER THEY HAVE BEEN BUILT. WITH THE USE OF A LITTLE INGENUITY AND EFFORT, THE SHELTERS CAN BE MADE MORE COMFORTABLE. SOME OF THE THINGS THAT CAN BE DONE ARE

- CONSTRUCT SEATS, HAMMOCKS, OR BUNKS
- COVER THE FLOOR WITH BOARDS, PINE BOUNDS OR LOGS AND DRAPE SHEETS OR MATERIAL OVER THE EARTH WALLS
- PROVIDE SAFE, DEPENDABLE LIGHT.
- FOR HOT WEATHER, CONSTRUCT THE EXPEDIENT AIR VENTILATION PUMP.
- FOR COOKING, CONSTRUCT THE EXPEDIENT COOK STOVE FOR USE IN THE ENTRYWAY. IN COLD WEATHER, SEAL THE ENTRANCE AND USE THE STOVE FOR HEATING. THE SHELTER AREA BE SURE VENTILATION IS PROVIDED WHENEVER THE STOVE IS USED
- STORE SHELTER SUPPLIES IN ENTRYWAY FOR MORE LIVING SPACE. COVER ALL OPEN CONTAINERS. RADIATION WILL NOT DAMAGE THESE SUPPLIES.

HUMANS MUST HAVE WATER AND FOOD TO LIVE. WHEN PEOPLE ARE TO LIVE IN A SHELTER FOR A WEEK OR TWO, SUFFICIENT FOOD AND SUPPLIES MUST BE PROVIDED FOR THE OCCUPANTS. THE MINIMUM NECESSITIES ARE

- WATER — MINIMUM REQUIREMENTS (DEPENDENT UPON TEMPERATURE — LESS IN

COLD WEATHER, MORE IN WARMER) WILL BE FROM ONE QUART TO ONE GALLON PER PERSON PER DAY. STORAGE CAN BE ACCOMPLISHED BY USING DISINFECTED METAL OR PLASTIC TRASH CANS OR BOXES LINED WITH STRONG POLYETHYLENE FILM OR STRONG PLASTIC BAGS. FOR PURITY, EIGHT DROPS (ONE TEASPOON) OF A 5 1/2% CHLORINE SOLUTION (e.g., CLOROX) SHOULD BE MIXED INTO EACH 5 GALLONS OF WATER.

- FOOD — ALL FOOD SHOULD REQUIRE NO REFRIGERATION AND SHOULD BE BROUGHT TO THE SHELTER IN AIRTIGHT TINS OR BOTTLES. UNDER SHELTER CONDITIONS, PEOPLE WILL REQUIRE ABOUT HALF AS MUCH FOOD AS USUAL. FOODS SHOULD HAVE A HIGH NUTRITIONAL VALUE AND A MINIMAL AMOUNT OF BULK (e.g., CANNED MEATS — FRUITS — VEGETABLES, DRIED CEREALS, HARD CANDY, ETC.)

- SANITATION — A METAL CONTAINER WITH A TIGHT FITTING LID FOR USE AS A TOILET WITH WHICH PLASTIC BAGS CAN BE USED. TOILET PAPER, SOAP, TOWELS, SANITARY ITEMS AND A QUANTITY OF STRONG PLASTIC BAGS WILL BE NEEDED.

- MEDICAL SUPPLIES — A WELL-STOCKED FIRST-AID KIT COMPARABLE TO WHAT IS USUALLY KEPT AT HOME. TAKE SPECIAL MEDICINES FOR INFANTS AND OTHERS AND A GOOD FIRST-AID HANDBOOK.

- CLOTHING AND BEDDING — SEVERAL CHANGES OF CLEAN CLOTHING, ESPECIALLY SOCKS AND UNDERCLOTHING — DEPENDENT UPON THE WEATHER, BLANKETS, PILLOWS AND SLEEPING BAGS MAY ALSO BE NEEDED.

- PORTABLE RADIO — LASTLY, BUT HARDLY LEAST IMPORTANT, A PORTABLE RADIO WITH FRESH AND EXTRA BATTERIES. RADIO STATION BROADCASTS WILL ADVISE YOU WHEN IT IS SAFE TO ABANDON THE SHELTER AND ALSO PROVIDE YOU WITH OTHER IMPORTANT EMERGENCY INFORMATION.