

## CHAPTER 22

### GRENADE RANGES

#### INTRODUCTION

2201. **General.** There are two types of grenade range:

(a) **The Basic Training Grenade Range.** The basic training grenade range is a purpose-built structure for grenade practices up to Trained Soldier level prior to going on to tactical grenade throwing on Live Fire Tactical Training (LFTT) exercises.



(b) **Tactical Grenade Range.** A tactical grenade range, for use by trained personnel, on a LFTT Area. It may comprise only protection for tactical grenade throwing as set out in Reference B (PAM 21) or temporary or permanent structures with protection as illustrated in Figures 22-2 to 22-6 and set out in Reference B

**Note:** In this chapter 'trained soldier' and 'infantry soldier' include any member of the armed forces acting in an infantry role e.g. RM, RAF Regiment and SF.

2202. **Aim.** This chapter covers the design and construction for both types of range and in particular:

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## SECTION 1 - THE BASIC TRAINING GRENADE RANGE

### GENERAL

2203. **Description.** The basic training grenade range has up to three throwing bays. To the left of the bays is a troop assembly building and to the right a dispersal building for those who have practised. An impact area of approximately 41 x 21 m is forward of the throwing bays and behind them is a protected tower designed to provide clear unobstructed observation into the throwing bays and protection for the RCO.

2204. **Purpose.** This range is for initial and refresher training. It cannot provide realistic operational or advanced training.

### RANGE DANGER AREA

2205. The RDA has a radius of 250 m extending all round the impact area (see Figure 22-1). The current grenade, L109 has a danger area of 200m from point of detonation. The impact area must be open to view by the safety supervisors in the throwing bays. The DA should be clear and open to view from the RCO's control tower; where this is not possible control measures must be in place which allows the RCO to be confident that the DA is clear. It may be necessary to post sentries to cover blind spots. An area to the flanks of the prepared impact area extending 20m beyond the prepared impact area must be kept well maintained in order to locate and clear any blind grenade thrown wide. Movement within the RDA beyond the clear area is to be restricted due to the possibility of blinds unless that area can be cleared by the RCO following the destruction of a blind. When using red phosphorous grenades RCO's must ensure the wind direction will not endanger those on the range as set out in Inf Trg Pam 13.

### DESIGN

2206. **Design Criteria.** The constructional details for the grenade range are shown in Figure 22-1. The range was designed for previous issue L2 grenade but is suitable for currently approved L109 Service hand grenades. The standard design includes sloping roofs on the assembly and dispersal buildings with the slope towards the throwing bay to avoid any ponding on the roof. Ponding can enhance the blast effect of grenades thrown onto these roofs and therefore could damage the roof.

2207. **Siting.** The range buildings and impact area require a reasonably level site as there must be no possibility of a grenade rolling after it lands whether deliberately thrown or accidentally dropped. The range should be sited away from roads and areas frequented by the public. The orientation of the range should be northerly so that the RCO is not looking into the sun.

## CONSTRUCTION

### RANGE FLOOR

2208. **Impact Area.** Targets, usually stick-in Figures 11 or 12, are set up on the impact area which is 41 m long by 21 m wide. The surface of the impact area is designed to minimise the blast and fragmentation effects of a detonating grenade. An essential safety function of the surface is that blinds can be easily located and destroyed. It is therefore of paramount importance that this can be done without displacing the surface or causing the grenade to roll. The surface has 300 mm depth of 20 - 40 mm angular aggregate with good interlock properties laid on a sub-base of 300 mm of compacted hardcore. The minimum size is to reduce the risk

of smaller stones being projected by the blast up into the tower. The maximum size is to prevent the risk of a grenade dropping into spaces between the stones. The interlock properties are to ensure the surface is stable when the RCO needs to approach a blind. It is to be graded and maintained level to avoid the risk of ponding in any depression, again this is to ensure when blinds occur they will be on the surface enabling blinds to be dealt with safely. The surface specification has been derived after lengthy trials and a lot of field experience. Although not ideal from other aspects and it is difficult to re-grade displaced aggregate, it is mandatory and may not be varied. The site may require sub-soil drainage to ditches or to lower ground.

**2209. Fencing, Flag Poles and Signs.** A suitable fence may be provided. Flag poles and warning signs are provided around the DA in accordance with Chapter 2.

## **RANGE BUILDINGS**

**2210. Throwing Bays.** Although the Figure 22-1 shows a layout with two throwing bays, the number may be varied from one to three, three being the maximum a RCO can effectively control. Each bay has sufficient space for the thrower and a safety supervisor. An emergency exit is provided in addition to the entrance route in case a grenade is dropped on the floor. The gravel floor has a 100 mm depth of 20 mm single sized aggregate laid on a base of 40 mm single sized aggregate 150 mm deep with sub-soil drainage as required. This specification is essential to safety as it has been designed to stop a grenade rolling and to absorb blast and fragments. The walls of the bay are capped and clad on the inside with timber to absorb blast and fragments should a grenade detonate in the bay. To prevent ricochet the side wall timbers are to be fixed horizontally as vertical faces can generate ricochet when vertical boards warp. Also the metal fixtures securing the cladding are to be countersunk or protected. The height of the wall from the gravel floor must be maintained at 1.35 m to provide cover for the occupants from the grenade detonating on the impact area.

**2211. Issue / Priming Bays.** An issue / priming bay is provided for each throwing bay.

**2212. Assembly and Dispersal Buildings.** Roofed buildings at each end of the range structure are linked by the open throwing and priming bays. These provide shelter and briefing areas for troops not engaged in throwing, and are fitted with benches. On some ranges the roof is used as an observation platform for trainees so that they can see into the throwing bays during the initial briefing and dry run through. Where this is the case, access and demountable safety barriers are to be provided. The roofs are constructed with a fall to the impact area and a parapet wall on the other three sides to ensure that a miss-thrown grenade remains on the roof and ponding that increases the blast effect of a grenade is prevented. The walls of the assembly and dispersal buildings rise above the priming bay. This area of wall and roof overhang is timber clad boards fixed horizontally to prevent splinters from the impact area ricocheting into the priming bay. It is essential that only softwood is used as plywood and similar materials are too hard. For the throwing bay, metal fastenings on the cladding are to be countersunk or protected.

**2213. Control Tower.** A control tower of sufficient height is provided to ensure that the RCO has a clear view of activity in the throwing bays where there is more than one throwing bay, of all movement on the range, and of the impact and DAs (see also paragraph 2205). The RCO has to be able to communicate and to command all troops on the range by voice or loud hailer. The control post on the tower must

be protected on the three sides nearest the impact area by splinter-proof walls 1.350 m high for the RCO to duck behind after observing the fall of the grenade. The viewing area above the walls must be open to allow splinters to pass through. Weather protection can be provided by light canvas screens in the upper portion but they must not hinder the all-round view of the range; hatches or splinter-proof glazed panels hinder the RCO's work and are themselves a source of danger. The roof slopes down to the front so that grenade splinters will either hit the top or pass through, and ricochet out of the tower to the rear. Columns supporting the roof must be timber or timber clad. Any roof supports should run front to rear to avoid backsplash surfaces above the RCO. A ladder or steps are provided at the back of the tower with a safety rail that closes after the RCO is in the tower. The tower structure from above the throwing bay wall height to the sill of the control post opening is clad in timber to prevent fragments ricocheting. The tower is provided and has protection for the RCO only.

### COMMUNICATIONS

2214. A means of summoning the emergency services, ideally a land laid telephone, is to be available and a telephone point may be installed in the control post

### MAINTENANCE

2215. **General.** Grenade ranges are often isolated and may not have a dedicated Range Warden. Certain items of maintenance are essential to the safe operation of the range. These are:

- (a) After each period of live training, the range structure is to be inspected for damage, particularly walls facing the impact area and the tower structure. Binoculars can assist in the latter.
- (b) Gravel in the throwing and priming bays must be raked level and the height of the front wall kept at 1.35 m. It will require occasional topping up with fresh single sized 20 mm aggregate.
- (c) The impact area surface has to be levelled and any displaced aggregate graded back into place. Aggregate that has broken down is to be removed and replaced with fresh aggregate. Aggregate displacement and degradation is usually caused by blinds being destroyed rather than thrown grenades detonating.
- (d) Debris is not to be allowed to accumulate on any part of the range.
- (e) Grass and vegetation in the RDA extending at least 20m around the impact area is to be kept short enabling RCO's to locate and clear any blinds landing wide of the prepared impact area. There is a legacy issue of blinds being thrown by the blind clearance charge out to 150m. Where there is not already control measures around the RDA to prevent access and until such time as the RDA is cleared by EOC, also revised measures in PAM 21 to contain blinds on the impact area, the RDA out to 150m minimum is to be treated as a controlled impact area.

2216. **Property Management.** Buildings, particularly the tower, will require periodic structural checks and it is essential the area remains well drained. Fencing and signs need to be checked at the same time.

## SECTION 2 - TACTICAL GRENADE RANGES

### GENERAL

2217. **Introduction.** Grenade ranges not conforming to the current criteria for the Basic Grenade Range may be used to train soldiers in tactical grenade training, but only when the range conforms to the requirements laid down in paragraphs 2218 and 2219. The Exercise Director and Exercise Planning Staff are to ensure the use of any constructed tactical grenade facility is safe for the practices to be undertaken and sufficient protection is provided for both exercising troops and safety staff.

### CONSTRUCTION

2218. **Field Firing Area Tactical Grenade Range.** Tactical grenade practices do not necessarily require a constructed range as suitable natural cover may be used. However, an example of construction for a semi-permanent tactical throwing grenade trench is shown in Figure 22-2 with grenade posting trenches shown in Figures 22-3 to 22-5. The area around these facilities requires careful selection to ensure full protection for grenadiers and safety staff and to locate and dispose any blinds. The standard grenade range mitigates errors of drill but this margin of safety is not available for tactical throwing. The minimum safety standards for a LFTT tactical grenade range are:

- (a) **Range Danger Area.** A 250 m (200 m for L109) radius RDA around the impact area over which safety staff can exercise control.
- (b) **Siting.** The impact area must be dry and firm ground with no more than light vegetation. No trees, hanging branches rocks or any obstruction that might deflect the grenade should be between the throwing position and the targets.
- (c) **Protection – Bunker and Shell Scrape.** Sufficient natural or constructed cover for all troops, including sheltering troops in fighting order, within the RDA is to be equivalent to the illustration in Figure 22-5 at Section XX:
  - (1) A minimum thickness of 750 mm of well compacted soil across the full height and width of the required cover.
  - (2) A minimum height of 750 mm for protection in the prone position and 1200 mm for CQB ranges where grenades are thrown during clearance operations.
  - (3) A minimum length of 1.5 m of protection is to be provided for each person taking cover.
  - (4) The design of the target must take account of the possibility of a grenade exploding outside the target area due to error by the grenadier. When posting grenades through the front protection is to be narrow enough for the grenadier to easily drop the grenade into a trench. There is to be no netting or cam nets that could snag the throwing or posting arm. Suitable trench design can be supplied by CD Combat for the grenadier, cover man and Safety Supervisor.

(d) **Protection – Temporary Structures.** Where tactical grenade exercises include structures, the minimum protection to be provided is illustrated at Figure 22-6. Sandbag protection walls are to be at least one bag wide (450mm filled). Softwood timber 25mm boarding or 5 ply may be placed on the inside surfaces to provide support to the sandbags and help avoid damage to the sandbags from grenade fragments. Where sandbag building facades are provided the internal ground is to slope away from the attack face and any objects such as rocks that may deflect a thrown grenade back out of a doorway are to be removed. Sandbags are to be well filled and compacted and laid in alternate courses in a similar way a brick wall is constructed. See details at Figure 22-6.

2219. **Targetry.** Most LFTT exercises will involve grenade throwing. Targets need careful construction if they are to provide protection from blast, and safety for the exercise, blind location and disposal. It is essential that no ricochet inducing materials are used in the construction of target trenches and bunkers. Examples of grenade targets are shown in outline in Figures 22-3 to 22-5. Urban targets are illustrated in Figure 22-6. Trials indicate that where urban training structures are provided external quality 5 ply is more resistant to grenade blast than timber boarding. Where such structures are to be engaged externally, timber protection to the sandbags will be required both internally and externally.

## COMMUNICATIONS

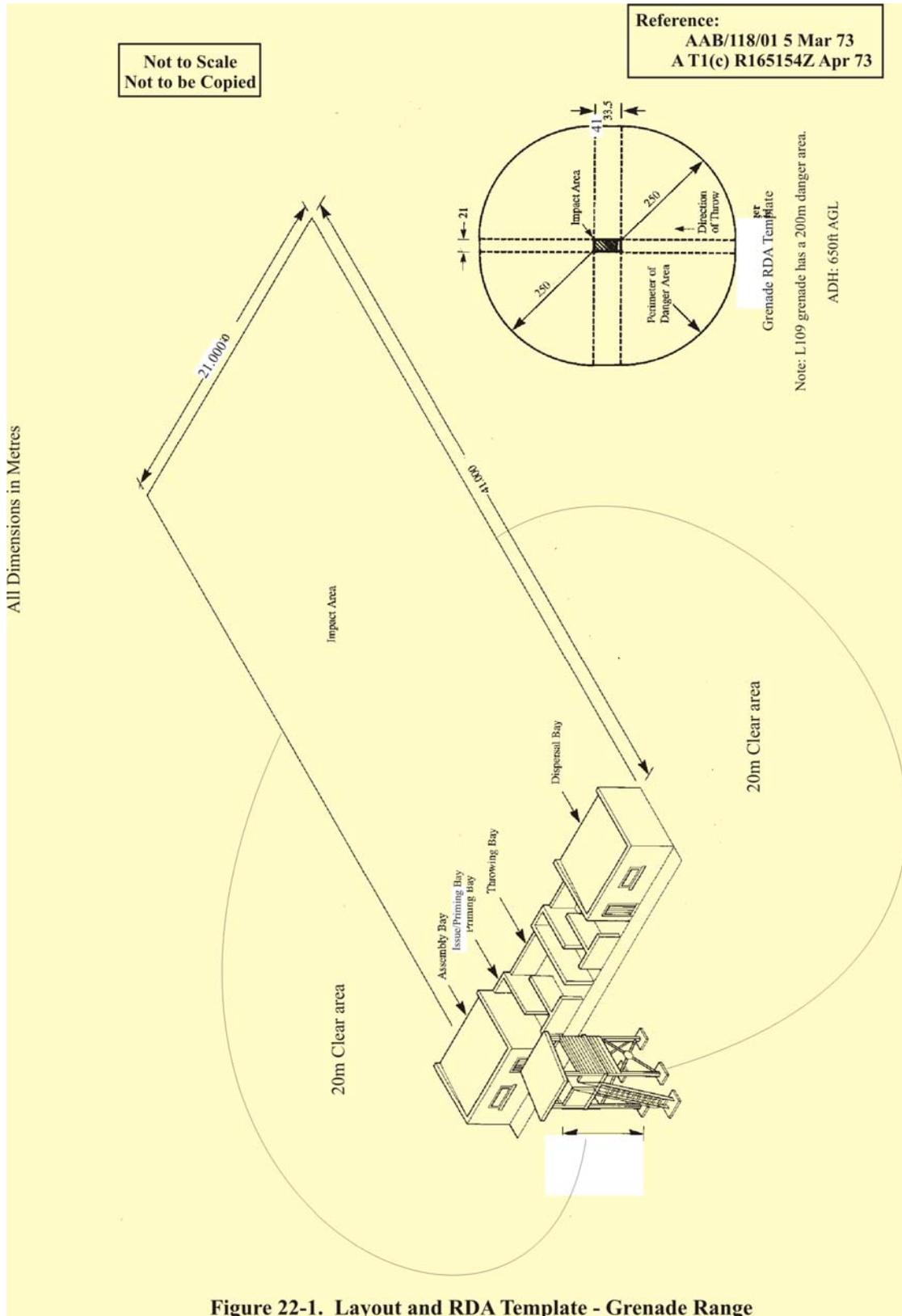
2220. A means of summoning the emergency services, ideally a land laid telephone, is to be available.

## MAINTENANCE

2221. **Tactical Grenade Ranges.** To ensure the safety of exercising troops, it is essential that the condition of the range is frequently inspected to ensure that the throwing and impact areas, and the cover for troops remain safe.

2222. **Targets.** Targets are to be inspected after each attack to assess the damage as a further detonation could render the target unsafe for use. It is essential to ensure that:

- (a) No obstruction has been caused that would prevent another grenade being safely used.
- (b) The minimum cover and safety requirements remain intact.
- (c) The area which will receive the grenade is clear of debris or water which would make locating or disposing a blind more hazardous.
- (d) If shell scrapes are required for shelter areas, these remain deep enough and with unobstructed access.
- (e) If a target is to be attacked several times, materials and manpower are on hand to rebuild the target to the requirements illustrated in Figures 22-5 and 22-6.
- (f) Any internal trench lining is to be flush with the trench wall to prevent the chance of blind grenades dropping into the gap.





Reference: TAS Drawing TO1195

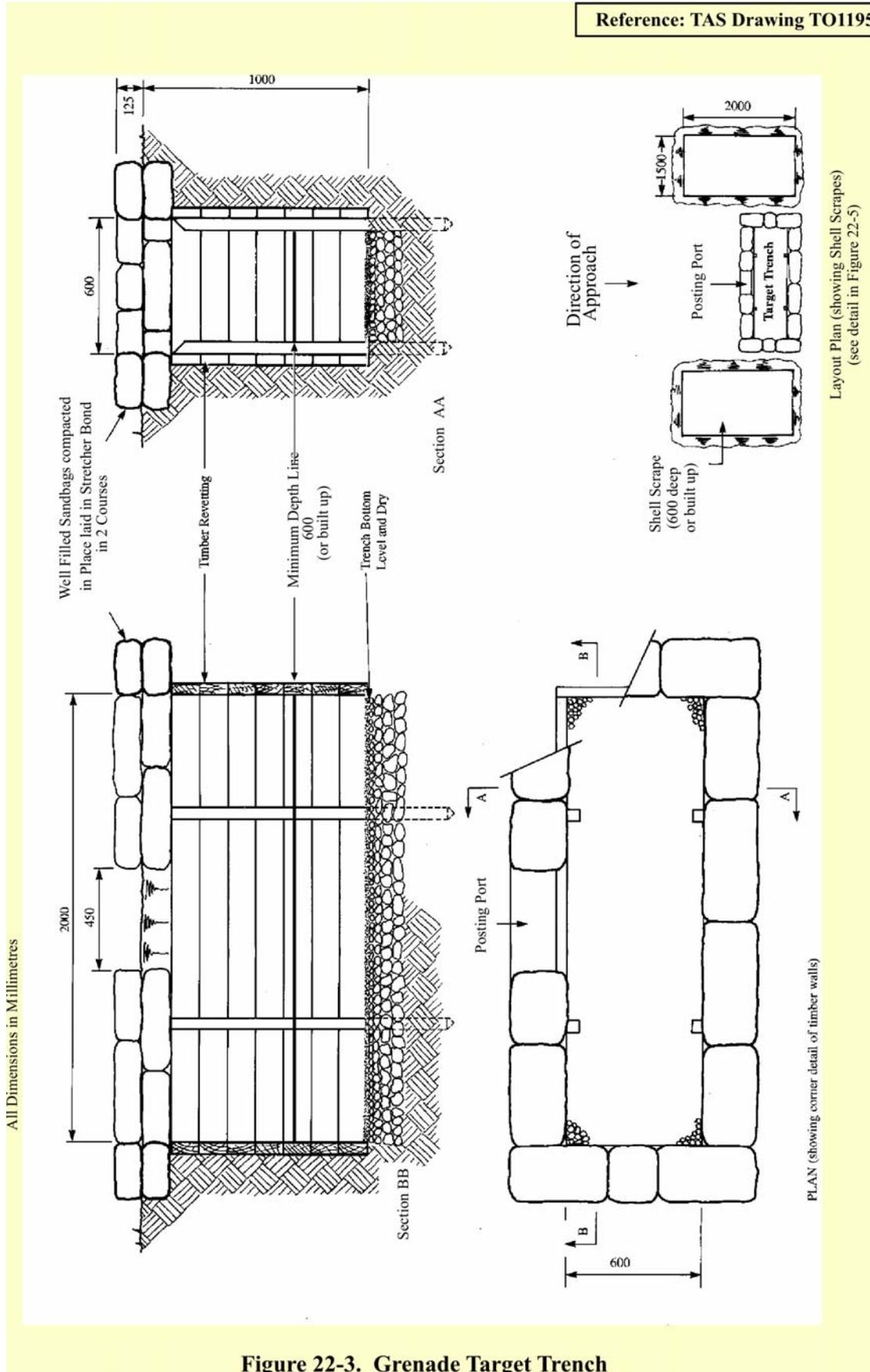
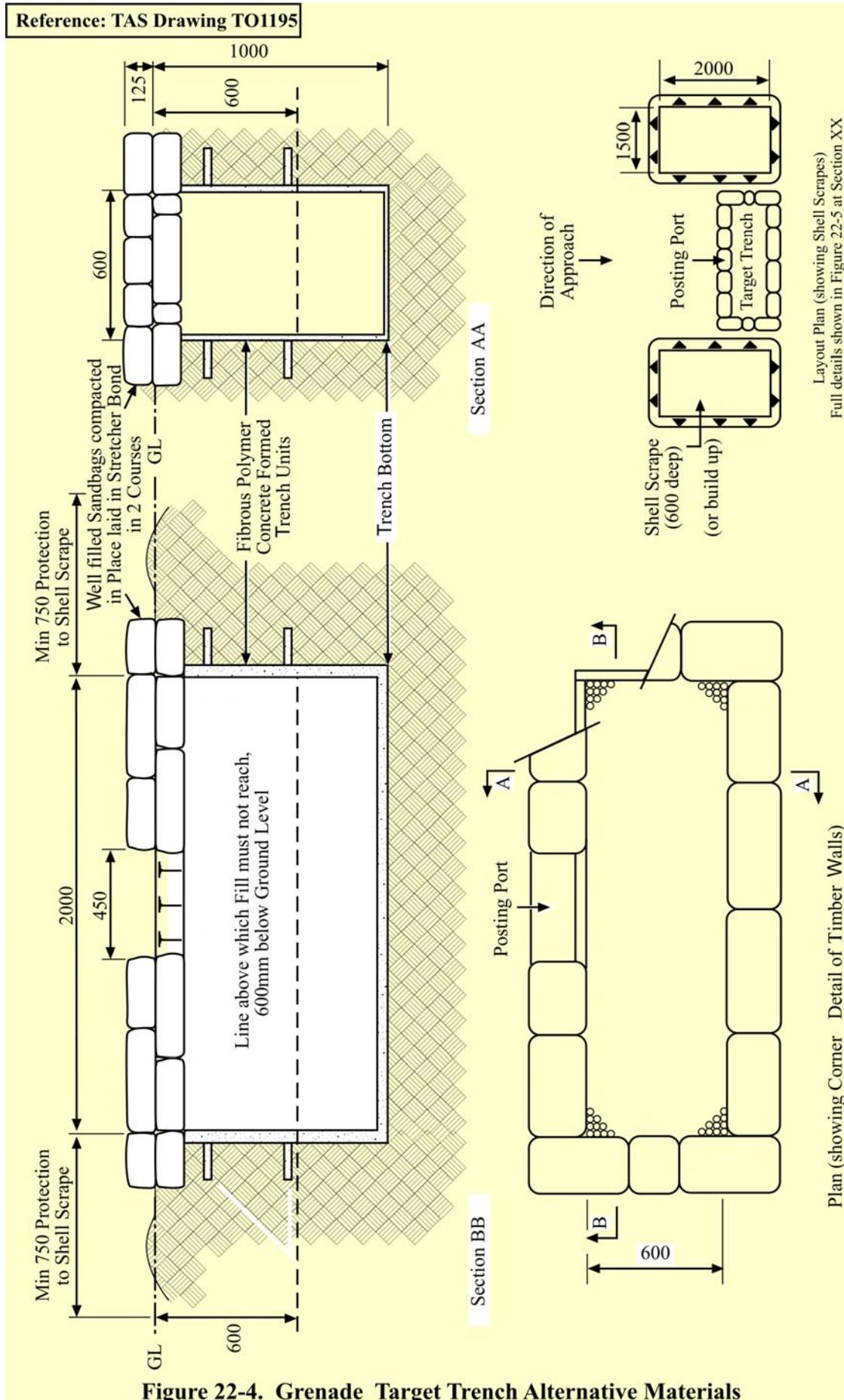


Figure 22-3. Grenade Target Trench



Layout Plan (showing Shell Scrapes)  
Full details shown in Figure 22-5 at Section XX

Plan (showing Corner Detail of Timber Walls)

